

# AMERICAN RAILROAD JOURNAL.

## STEAM NAVIGATION, COMMERCE, MINING, MANUFACTURES.

HENRY V. POOR, Editor.

ESTABLISHED 1831.

PUBLISHED WEEKLY, AT No. 54 WALL STREET, NEW YORK, AT FIVE DOLLARS PER ANNUM IN ADVANCE.

SECOND QUARTO SERIES, VOL. V., No. 29.]

SATURDAY, JULY 21, 1849.

[WHOLE No. 691, VOL. XXII.]

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Saturday, July 21, 1849.

### Copper Ores of Lake Superior.

Continued from page 434.

**Veins.**—The great peculiarity in the metallic veins of this district is, that the copper occurs almost universally in its native state. Veins of its ores are comparatively rare. But the course of them all, whether characterised by native copper or vitreous copper, or other ores, is such as to refer them to the same system. The causes that produced the vein-fissures acted at right angles to the bearing of the trap ranges, and the veins consequently running across them, and come down straight to the coast, the line of which is parallel with the belts of trap. There is, however, another set of veins of more obscure character, not so promising in their metallic contents, which run longitudinally with the ridges, holding their course straight through the north and south set. These latter are heaved by them and in one instance the north and south vein was found much enriched near its contact with the other. But the east and west set is not known to be productive in ores, unless it be on the south side of the Point at some mines opened since my visits, which are favorably spoken of.

The gangue of both is usually quartz of exceedingly hard and close texture. Through this the copper is disseminated in fine particles, or occurs in lumps and sheets of all sizes. A little silver is

occasionally found accompanying the copper—both alloyed with it, and another portion uncombined with the copper, though united closely to it in one piece. This singular union of the two metals may be effected in a crucible by partial fusion. Perhaps in a long process of cooling a separation may take place even after a perfect alloy had been formed.

Besides quartz, other gangues are of frequent occurrence, particularly laumontite, prehnite, chlorite slate and calcareous spar, the last being the prevalent veinstone in the conglomerate and sandstone. In one instance, at Agate Harbor, it was associated with sulphate of Barytes, and the copper occurred as a grey sulphuret. The most common crystals in the veins, which cannot be regarded as gangues, are various forms of calcareous spar, stilbite and analcime. The veins vary much in width as well as in composition in the different rocks, through which they pass. In the compact trap they are pinched, and the gangue is usually quartz or chlorite slate with little copper. In the amygdaloid they widen out, and the best veins yet found appear to be in this rock. In the conglomerates they are huge collections of white calcareous spar, which are well marked in the rocks along the coast, and in calm weather may be traced far out into the deep water, from the canoe, that floats high above them. In the veins in the conglomerate rock large masses of crystalline copper are sometimes found completely embedded in the calcareous gangue; but though of great weight, reaching occasionally 1000 lbs., their number has not been sufficient to encourage the continuation of the exploration of these veins. The rich black oxide of copper, found in Copper Harbor was in a vein of conglomerate rock, but though the surface indications were very encouraging, the vein did not prove worth working. So at Agate Harbor, where a shaft was sunk ninety feet, the vein was no richer at the bottom than it had been near the surface. The description I shall give of more successful operations will go to establish the point, that it is the amygdaloid that is to be regarded as the true metalliferous repository.

The copper occurs also disseminated through the wall rocks, sometimes many feet from the vein. One of these "stockworks" has been estimated extremely rich, and indeed was considered by those who wrought it as the vein itself.

An interesting feature in these veins is their tendency to wear away from atmospheric causes faster than the rocks at their sides. The consequence

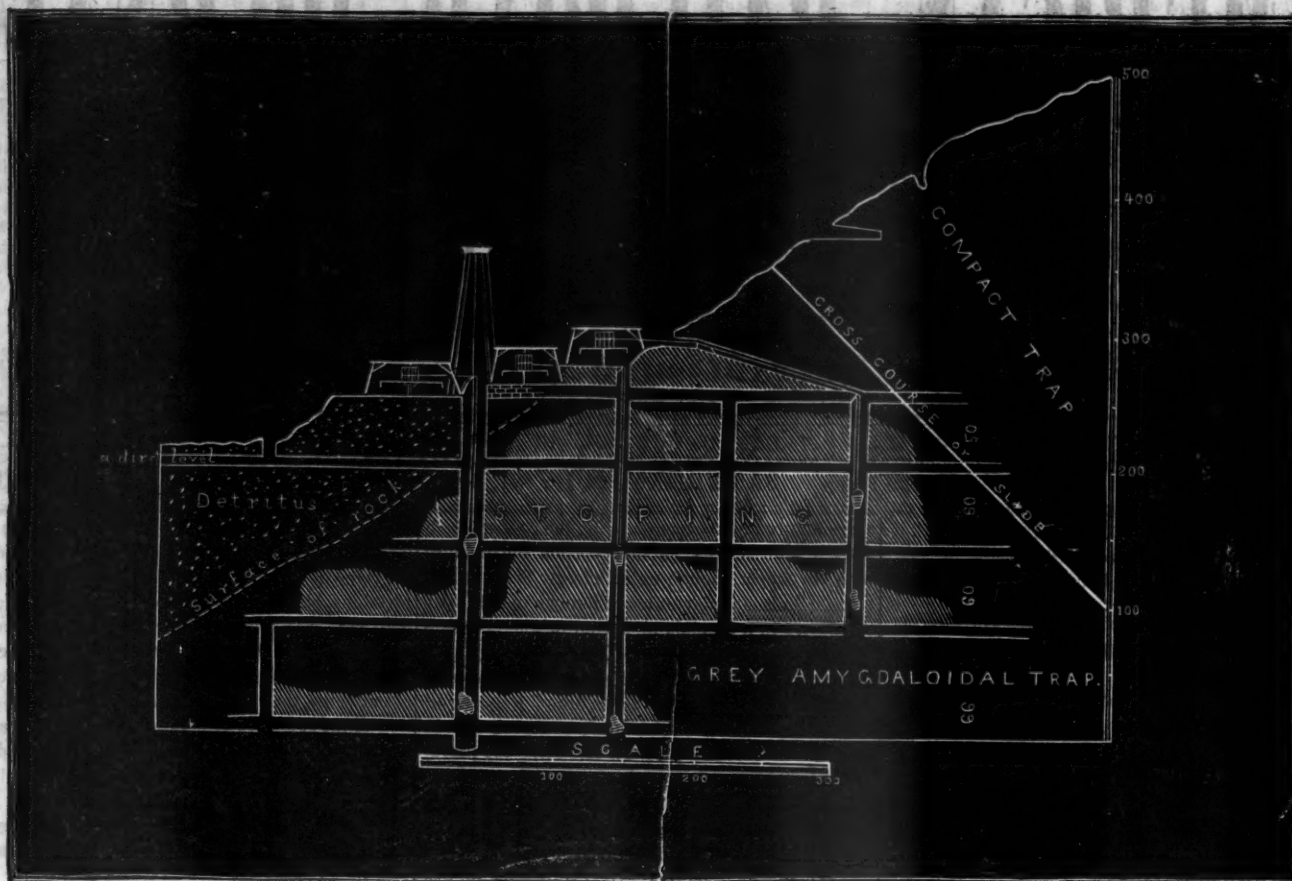
of this is that their position is marked upon the surface by a depression in the soil or a break across the ridge or trap. The rivulets fall into these depressions, and enlarge and deepen them: and though their beds may finally be filled in with loose materials, and even become dry, yet when these are found pursuing for some distance the general course of the veins, they may be considered a true indication of the existence of a vein beneath. A stranger would be astonished to find how much dependence can be placed upon this guide; and how readily the eye of one skilled in these researches marks a vein here and there, where he can perceive nothing unusual. The gold veins of the south are characterised by a quality the very reverse of this, for they weather better than the rocks that contain them, and consequently project above the surface; they are frequently seen crossing the roads in a little ridge or dyke, which, if attention is not first directed to them, are sure to attract it by the unpleasant jolt they cause. The coal beds of the western coal fields are most distinctly marked on the hill sides by the benches at their outcrop, which I have already found an infallible guide to their position; and the lead veins in Wisconsin are marked by lines of depression similar to those of the copper veins of Lake Superior. Thus by these curious contrivances is the place of these useful materials revealed to those who seek them out, and who make their study the laws of construction of the materials of the earth and the changes to which they have been subjected.

I shall now proceed to the description of some of the best developed mines with which I am acquainted.

### CLIFF MINE:

The most successful of the early explorations in the Lake Superior region, were those of the Pittsburg and Boston company in the high cliffs of trap rock, three miles above the mouth of Eagle river. In the spring of 1845, a quartzose vein, containing laumontite and calcareous spar, with small particles of copper and less silver was discovered in the steep face of the cliff on its southeast side, passing vertically across the line of the ridge in a course N. 26° W. On the side where the vein was exposed, the ridge presents a bold face of high walls of massive trap, with occasional depressions or breaks, which are usually occupied by veins, their materials having been gradually removed by atmospheric agencies, which the trap-rock better resisted,

## Profile of Cliff Mine, Copper Harbor.



The profile, above represented, was executed by William Schlatter, Esq., of Copper Harbor, and represents the present condition of the workings in the mine, and of the portions of the vein already removed by the process called *stopping*, or working by stopes or steps. These are the parts shaded by oblique lines.

On the northwest side the ridge falls away gently towards the lake. Its height above the lake in the gap where it is crossed by the road from the mouth of Eagle river, is 619 feet, as I found by observations made with one of Bunten's mountain barometers. The platform of the main shaft of the mine, at the base of the cliff, is 430 feet above the lake, and 190 feet being added to this, which is the height of the cliff above this point, the whole elevation is the same as in the gap.

The upper portion of the ridge is compact greenstone trap, lying in large stratiform masses, whose direction is the same as that of the ridge, and whose dip is towards its axis. Beneath this, with the same dip, is a cross vein of quartz, some three feet thick; and under this amygdaloidal trap. This variety of trap prevails below the cross-course; there are places, however, where the rock appears compact again, as is seen in the main shaft in thin bands alternating with the amygdaloid. The vein was traced down the face of the cliff on the surface in many little strings and feeders of laumontite and quartz, with occasional show of specks and little lumps of copper; their whole thickness was less than a foot, and they seemed little indicative of the richness of the vein below. Followed into the rock, the size and number of the masses of copper rapidly increased, particularly in the amygdaloid directly

under the cross-course; but in the compact trap above the vein was unproductive. Besides this apparent effect of the cross-course upon the contents of the vein, it had also thrown it somewhat out of place, the upper portion of the vein lying to the left or west of the lower part. In contact with the cross-course, the lode swelled out largely, and here furnished large masses of copper and more native silver than was found in any other portion. The large irregular excavations, seen in the engraving at this point, were made in consequence of this swelling out of the lode, which extended even to twelve feet in width. But before discovering this point some levels were run into the rock at considerable expense, and with much discouragement, which failed entirely of any important development; and it was not till the winter of 1846-7, when the country was shut up by snow and ice, that the rich masses below the cross-course, and the extraordinary specimens of silver and of silver and copper mixed were found. A man on his way through the country on snow shoes happened to stop at the mine, and loaded himself with twenty-six pounds of these metals, which then appeared to be fair samples of the lode. On his arrival in Boston, three analyses were made by A. A. Hayes, Esq., and the results were of one—twenty-seven per cent. of silver, equal in value to \$10,000 per ton; of another, sufficient to give \$3,700 per ton; and of the third, seven per cent. of silver, or \$2,800. This last showed no silver to the eye. Of course such results created a great excitement, and the report brought with the samples being that the whole vein was of this character, which was then supposed to be the case, the shares very naturally rose to extravagant rates; and it was not for months

afterwards, when navigation opened, and large quantities of ore were shipped to Boston, that the true character of the vein began to be understood.

The principal shaft commenced near the bottom of the cliff, and passed down 20 feet through sand and gravel, and has thence been continued through trap and amygdaloid to the present depth of 250 feet. At its top one of the principal levels runs into the cliff, and at the depth of 57 feet, it is crossed by the adit level driven in from the swamp below, a distance from the shaft of 483 feet—most of the way through quick sand. There are three other levels below, at distances of 60 feet apart. Two other shafts are sunk from the upper level under the cliff, which are connected with the main shaft by the lower levels, & large portions of the lode between the shafts have been removed by stopping. The mine is remarkably dry;—the water accumulating in 24 hours being discharged in two hours by a horse-pump. The copper is found in rough irregular shaped sheets and masses, and in points, lumps and strings mixed through the veinstone. This is principally quartz, sometimes calcareous spar, more rarely epidote and prehnite. The masses are elongated sheets of irregular shapes and rough surface, more or less mixed with the veinstone: some are nearly pure copper, losing in refining not more than five per cent. They stand edgewise along the vein, sometimes several side by side, separated or not by a little veinstone or else *fluca*. The size of some of them is enormous. I have passed along the side of one, as it stood in the vein, for thirty feet in length the whole wall on one side being solid copper six feet high. The thickness of the sheet varied from six to eighteen inches. Neither of its limits in



length or depth were then reached. But subsequent statements represent it to have been from 50 to 60 feet long, and 15 to 20 feet deep. And when it terminated below, other sheets lapped against its lower edge, carrying down the same metalliferous belt, with only occasional interruptions of greenstone.—Some of the masses have been found no less than three feet thick, and when cut through with chisels, the face is soft copper nearly pure. The greatest weight of single pieces has been about eighty tons. Great difficulty was long experienced in breaking up and removing such masses. Holes drilled and charged behind them would blow out, though ever so well tamped, as a charge from the barrel of a rifle. The rock around was moreover so filled with copper that it was extremely difficult to succeed in drilling holes at all, many attempts frequently being made before one was effectual. Finally, the cold chisel was found best suited for this work; and the masses when cut up are drawn out of the shaft by an eight inch rope, in pieces weighing some of them six tons.

Besides these masses of native copper, the lode furnishes a large amount of "stamp work," which is veinstone with copper in small particles diffused through it. This after roasting, to diminish its toughness, is taken to the stamps (eight in number at present,) which are run by a small steam engine; and the fine copper is collected from the washing flows below, of which there are three, one below the other, the washings of each lower one being less rich than of the one above. This is barrelled up, as are also the smaller masses or "barrel work," in strong casks made at the mine.

The thickness of the vein may be estimated at about twenty inches on the average. It spreads out, as before remarked, to a much greater thickness, however, and is contracted sometimes to four or five inches of veinstone, with not more than two or three per cent. of copper. Its greatest thickness rarely exceeds five feet. Its lines of separation from the walls is not always well defined, the copper spreading into the amygdaloid. The gangues are distinct however, and sometimes cleave perfectly from the rock at the sides. To give the average richness would be a difficult computation, the percentage lying between the extremes of the poorest veinstone and pure copper. But large quantities that have been sold in Boston have given of the masses 94 per cent., and of barrel ore 63 per cent. Including all from the stamps, it is usually estimated to yield of all kinds between 50 and 60 per cent. The quality of the copper is much preferred for all purposes to that smelted from the ores.

The silver attached to, and mixed with, the copper, but not alloyed with it, has been found in considerable quantity, as I have before stated: but this is very uncertain, and what is met with is in great part purloined by the miners. I have now before me six pounds and eight ounces, avoirdupois, in rough lumps and hammered bars, which have been seized from one of the men, who was about absconding with it.\* There is good reason to believe that several thousand dollars worth is now kept concealed by the hands. It is forged into clumsy finger rings, the same ring showing streaks of copper and silver, and is carried off in lumps and bars. The quantity secured by the company has not been sufficient to affect the value of the mine, nor excepting in some small parcels, to make it an object to separate from the copper.

No ores (properly called) of copper or silver are

found in the vein except mere coatings of the red oxide and carbonate of copper. On the continuation of the vein over the north side of the ridge the trap rock is porphyritic; and in this portion of other similar veins, on the same ridge I have seen small particles of sulphuret of copper scattered in the veinstone, and the vein, moreover, was here better defined at the surface than even in the amygdaloid.—It is to be regretted that no shafts have been sunk in the vein in this rock, which is in other parts of the world generally regarded as the most favorable for the development of metallic veins.

At present about 150 men are employed at the mine; and the amount of ore prepared for shipment is estimated at 100 tons per month, or say 1,000 tons for the year. There have already been shipped since the opening of navigation, which is now only a month, about 300 tons. But a small proportion of the stamped ore collected in the winter has yet been washed.

The following data are extracted from the Report of the President and Directors of the Company, dated January, 1849.

"About one-third of the entire product is of sufficient purity to ship to market in the shape in which it comes from the mine; producing when refined about 60 per cent of pure copper. The poorer ores are crushed and washed at the mine, and brought up to a value of 60 or 70 per cent."

"Eight hundred and thirty tons of mineral, averaging 60 per cent., were shipped from the mine in 1848. The superintendent estimates the product of 1849, of the same description, at 100 tons per month. It would be safer, probably, to say 1,000 tons for the season."

"On stamping or washing the poorer ore, small particles of silver, from the size of a pin's head to half an ounce, make their appearance, which, on being flattened in the process of stamping, are readily separated by means of the fingers. One thousand dollars worth was selected from 88 tons of the stampings, which were sent to Pittsburg the past year."

"The force employed on the mine consists of one superintendent, one mine-captain, one assistant mine-captain, one clerk, and 146 miners and laborers. The labor in the mine is chiefly done by contracts, which are let to the best bidder, at the commencement of every month. The aggregate monthly wages in 1848 of the whole force averaged \$5,140. The total monthly expenditures of the company for the same year averaged \$7,073, and are estimated at about the same for 1849.

Fifty acres of land have been improved, twenty-five of which are under cultivation; and it is the design of the directors steadily to progress with the improvement of the surface, until a sufficient quantity of land shall have been cleared, to furnish hay and pasturage for the teams, and an adequate supply of vegetables for the inhabitants.

Twenty-five buildings have been erected, constituting quite an imposing little village, whose inhabitants number about 300 souls; having its regular physician, a preacher of the gospel, and a schoolmaster.

During the last year the company has availed itself of its pre-emption claim to this location, and purchased the lands from the United States Government at the minimum of \$2 50 per acre, the whole number of acres being 4350,53-100. This purchase of the fee exempts the company from any further payment of rent on the mineral."

"At a meeting of the Directors of the Company held on the 26th of January, and after a careful ex-

amination into the state of its affairs, it was adjudged expedient to pay to the stockholders a dividend of \$10 per share, as soon as the refined copper now on hand may be got to market and converted into money for that purpose, and it was accordingly

*Resolved*, That a dividend of ten dollars per share on the capital stock be paid to the stockholders on the 21st day of May ensuing."

The whole number of shares is 6,000, the rate at which the stock was lately selling at the east was from \$60 to \$70 per share. From the present very favorable appearance of the lode, and the flourishing condition of the mine, the price has probably risen since the last account. The small sales made in the mining country are always at a higher price than at the eastern cities.

The copper is now all taken to Pittsburg, where the company have built a furnace for smelting it. The product for the year 1848 sold and smelted, according to the report above referred to, was \$166,407 02; and the value of ore on hand was \$35,664,96; making \$302,067 96, as stated with slight error in the figures. The product of the year 1847 was about \$71,000, and of 1846 \$8,870. The total expenditure, which includes about \$25,000 expended at another mine at Copper Harbor, now abandoned, which mine produced only \$2,968 worth of ore, has been \$289,456 89. The total product \$284,884-93. So that the mine has paid for itself and for a multitude of heavy expenses new operations of this kind must always meet with in a new country, and which cannot hereafter recur. The present workings show no evidence of any falling off to be anticipated in the productiveness of the lode, but on the contrary the deeper the workings the more productive they are found in general, though barren spots are often met with for a time. Confidence may be felt in the continued richness of the lode just so far and so deep as the amygdaloid shall be found to continue, and there is nothing yet tending to show that it is to give place to any other belt of rock below.

The following table from the report is a statement of the mineral raised from the cliff mine, monthly, for the year ending Dec. 1, 1849."

|           | Ore suitable to ship in barrels as it comes from the mines—equal to 50 per cent. of pure copper. | Masses as they come from the mine—equal to 65 per cent. of pure copper. | Mineral to be stamped, estimated at 8 per cent. of pure copper. | Total No. lbs. |
|-----------|--|---|---|----------------|
| Dec. 1847 | 31,843   | 161,221   | 140,000   | 333,064        |
| Jan. 1848 | 34,770   | 147,687   | 150,000   | 332,457        |
| Feb. do   | 36,187   | 117,417   | 186,500   | 340,104        |
| M'ch. do  | 50,585   | 146,936   | 358,500   | 556,021        |
| April do  | 58,222   | 97,631  | 328,000   | 483,853        |
| May do    | 33,981   | 102,155   | 311,000   | 447,136        |
| June do   | 55,797   | 97,364  | 393,392   | 543,553        |
| July do   | 41,280   | 59,633  | 309,000   | 409,913        |
| Aug. do   | 42,374   | 65,062  | 490,500   | 597,936        |
| Sep. do   | 35,574   | 47,490  | 508,500   | 591,564        |
| Oct. do   | 30,667   | 73,734  | 390,000   | 494,401        |
| Nov. do   | 38,207   | 93,522  | 314,000   | 445,729        |
|           | 486,487 lbs  | 1,209,844   | 1,879,392   | 5,575,731      |

New York, July 19th, 1849.

I have to-day reached New York on my return from the mineral region of Lake Superior. During my absence I enjoyed favorable opportunities of visiting the principal mines, and am now prepared to continue the account of the operations up to the present time. But as a weekly description of one or two mines will slowly bring out the conclusions as to the consequence of this region, to which my observations have led me, I will here anticipate them, and state in general terms, my opinion of the

\* Mouth of Eagle river, July 4th,

mines, trusting to the future details I shall give to sustain it.

The account of the Cliff Mine in the Journal of this week has introduced to the reader the best developed of these wonderful repositories of native copper; but excepting of this mine, few favorable results are known to the public. Other operations have generally been regarded as speculative or uncertain. But during the past three years, which have elapsed since I was at the Lake, other mines have been opened, which not only bid fair to produce, but actually show masses similar to those of the cliff mine, following each other along the course of the vein as in this mine. Quantities of native copper, in masses and in stamp work, have been extracted from veins, which three years since only showed upon the surface similar indications to those of the Cliff. A character is consequently given to a considerable number of other localities, which, when opened are not unlikely to prove also valuable mines. Their product being *metallic* copper instead of *ores*, and the abundance very great, the estimate of their value cannot but be extremely high when the most profitable mines worked in the world are often found to be mines of copper *ores*. I am prepared with data to show the range and extent of the region containing these veins so far as explored. The choice spots in it are limited, as one would infer they must be from their extraordinary richness; but their number, as I have convinced myself by explorations, extended over a considerable area of wild country, is sufficient to warrant me in expressing the opinion which I do with careful consideration, and with full knowledge that many veins seen at the surface will be found unproductive beneath, that the region is soon to be admitted as one of the richest and the most wonderful copper mining countries ever yet discovered—that its products are destined ere long to take the place of many other copper mines, which must in consequence be abandoned, unless new uses are found for supplies of the metal sufficient to keep up its present price.

Still even with our increased knowledge of its resources the prosecution of mining enterprises in the region will be attended with hazard; and unless directed by careful economy and good judgment, they will fail even in the choicest localities. And before a general knowledge is had and full confidence felt in some general principles of curious nature, which have already been discovered by the close observer as bearing upon the productiveness of the different veins, many works will no doubt be commenced, which will prove unsuccessful, and involve losses to no small amount. It is consequently a business extremely unsafe, except to those who can afford to loose the capital they invest. By such rich prizes must be drawn, no doubt far exceeding any in immediate prospect in this so early period of the mines.

The articles on Iron have been interrupted for a time, but they will hereafter appear weekly, as before. The next number of the Journal will commence with the iron mines of Connecticut.

J. T. H.

#### Railway Economics—Permanent Way.

In last week's number we canvassed the question of permanent way at some length, having reserved for this the consideration of the most important head of the subject—the rail.

Engineering may, according to our views, be defined the economics of construction:—for chiefly in the saving of material can the work of the scientific engineer be distinguished from that of the random constructor. The true spirit of the profes-

sion we take to be an economic spirit; and therefore in dealing with the question under consideration, would begin by calling the attention of our brethren throughout the country to the fact that while wrought and cast iron fulfill very nearly the same conditions as materials for rails, *wrought iron is twice the cost of cast*. We will start in our reasonings from this premise.

A wrought iron rail, 36 lbs. to the yard, on the Liverpool and Manchester line in England, was found by Chevalier Pambour to have lost under a traffic of 600,000 tons distributed over a period of 21 months, a weight of only 18½ ozs. The wear per annum in this case was but 1-268 of the original weight; on the evidence of this fact, it would, to use the words of the chevalier, "require more than a hundred years to reduce the rail to half its original strength." If we assume that this particular rail was placed under the most favorable circumstances, that is to say that its full amount of wear was directly chargeable to friction alone, we must refer the great surplus above this wear found in the modern practice to the modern conditions of locomotion—to heavier engines and higher velocities.

All experience shows that stiffness in a rail is necessary to the full amount of its service. Weaken a bar below the required degree of stiffness, and you introduce, in addition to the friction, those other causes, that are distinguished in their effects from ordinary wear by the peculiarities included in the term "deterioration." The deflections arising from insufficient strength, while they do not actually break the malleable rail must materially lessen the cohesion of its particles; and therefore by admitting the laminae of the metal to spread under heavy loads, cause the surface of the rail to break up into scales. This effect must go on from the commencement in a progressive increase, seeing that every shock on the rail tends to increase the first injury done to the cohesion. These considerations lead directly to the adoption of a rail approximating as close as possible to absolute rigidity, both laterally and vertically. But besides these there are other grounds for such a conclusion. The traction on a good horizontal railway is found to be say 1-200 of the load; Now a deflection of ¼ of an inch at the middle point between the supports in a rail, supported at intervals of 33½ inches, will give an inclined plane of one in fifty; and consequently, involving, in addition to the traction on the level, the raising of a weight equal to 1-50th of the total loading, will require from the engine ascending it a power five times as great as that necessary to move the same load on the level. An engine therefore working on a rail so weak as to deflect even ¼ of an inch at the middle of a span of 33½ inches can do only 1-5th of the work it would do on a rail of sufficient strength. Indeed an engine moving at a high velocity will not follow the line of deflection; but at a certain point of it bound from side to side of the curve, striking the rail in its descent with a force equal to a proportion (varying with the incline) of the product of the weight and the velocity. Le-count in his treatise on railways instances an experiment in which a rail having a set of half an inch, being coated on the top with paint, was passed over by a heavy train, the paint remaining untouched by the wheels for some ten or twelve inches on each side of the lowest point of the rail. Here then is an amount of percussion that must not only crush the metal at the point of application; but also cause other percussions by starting the fastenings of the rail. In consideration of all these and other causes that are too clear to require description, we are of

opinion that the greater is the rigidity of a rail within the limits of easy transit, the more closely are the wear and tear reduced to the simple effects of rolling friction.

Now why is cast iron, seeing that it is only half the cost of malleable, not introduced more largely into railway tracks? Malleable iron certainly admits of a greater amount of deflection before its elasticity is destroyed; but we are inclined to think that this is questionable ground for the exclusion of cast iron. Rigidity in a rail has been shown absolutely necessary to keep the wear within proper limits—the limits of friction—and therefore as the only elasticity necessary in the case is that for obtaining easy transit, the conditions of the most durable rail laid on wood fall within the elasticity of cast iron.—The longitudinal bearer seems to us to possess no greater advantage than that of adapting the conditions of the rail to the properties of cast iron; for how indeed can it be imagined necessary for a rail resting on a continuous bearing of hard timber to admit of a greater deflection than 1-40 inch to the running foot, which is fixed as the working limit of deflection for cast iron? Wrought iron decomposes very rapidly when exposed to moisture; on the other hand, cast iron under the action of the weather endures for a long time. Wrought rails are something harder than malleable, and according to the experiments of Professor Barlow offer very nearly equal resistance to the wheels. It strikes us, however, that the crystalline particles of the cast iron are very apt to break up under the loads that would probably have the effect of rendering malleable iron only more malleable. On this latter score, together with that of the easier motion obtained by using the softer material, we are inclined to think malleable iron the better metal for presenting to the wheel of railway carriages. We have detailed our reasonings on the case here at full length, and proceed now to combine the conclusions drawn from them in a practical application.

The rail we obtain from the conditions arrived at is

#### THE CHAIR RAIL.

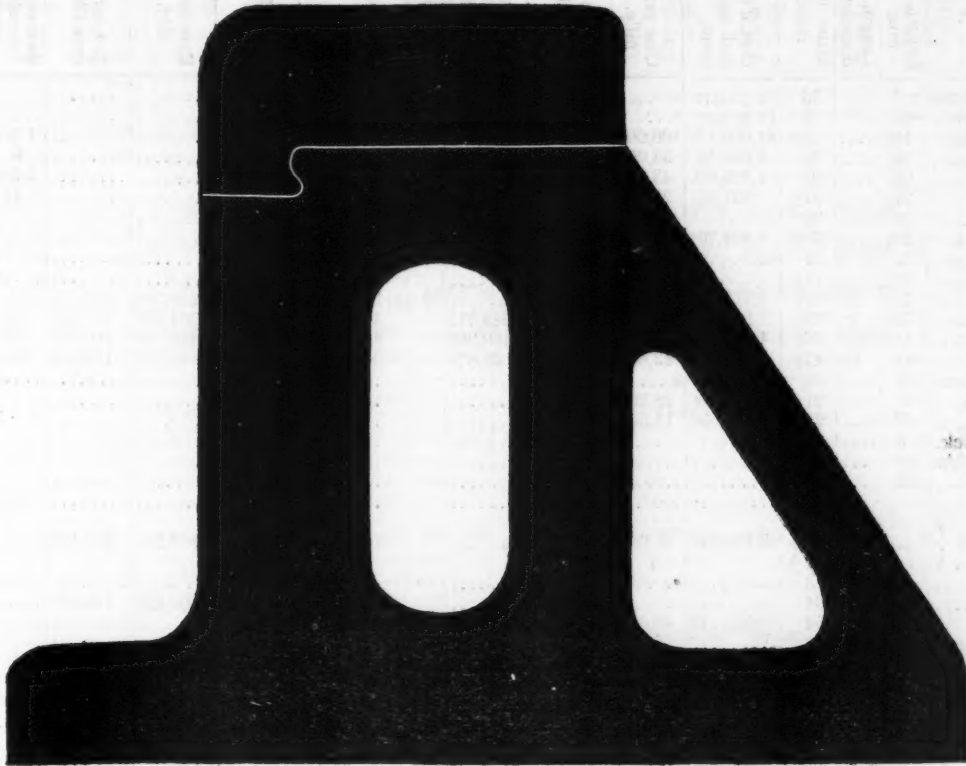
This we describe in the following specification:

The chair-rail consists of two parts; the upper, a wrought bar to receive the wheel, the lower, a cast frame or chair to sustain the bar throughout its whole length. The rails break joint with the chairs; and are bound to them on the extreme side by iron dowels. The dowal used is peculiar—a dovetail in plan and a double dovetail in section. Before fastening the rail on the chain the dowal sits in a chamber larger than itself, and of a shape exactly similar, this chamber being for one-half its section within the rail for the other half within the casting. An arm with a slit or elongated hole in the top of it, projects from each dowal while sitting loosely in its chamber for a length sufficient to allow part of the slit to appear outside the rail. An iron wedge resting against the rail is driven into the slit of this arm; this forces out the dovetail farther into the chamber, draws the rail tight up both 'bed' and 'build' to the castings, and besides fixes the rail and casting together at all points in a manner perfectly immovable as long as the wedges are allowed to remain in the slits.

The chair or frame is fastened to the timbers by bolts made to alternate, these on the one side with those on the other in order to increase the steadiness by increasing the number of fixed points. The strutting on the extern face of the casting is divided into a series of distinct struts, each a sufficient distance in the clear from the other to admit between them the bolts used for fastening that side of the rail to the



## The Chair Rail,



timbers; but exactly opposite these intervals or opens between the extern struts, other struts twice the width of these opens are cast on the inner side so that the strength of the rail may be equal, or very nearly so, at all points along its length. A slightly cylindrical end on each casting fits into a corresponding hollow on the end of the next one; this has the effect of preserving throughout the whole an unbroken evenness of surface. A hearting of wood well creosoted and tarred perfectly water-tight at the ends is inserted into the hollows of the frame-chairs with the view of preserving the metal on the inside from the injury likely to result to it from damp or wet.

Vulcanised India rubber, compressed to one-eighth of an inch by a force equal to the maximum traction on the rails, is introduced between the ends of the castings in order to allow the iron sufficient play for expansion. The bolts on each side of the middle of a frame-chair as representing a point permanently fixed, are of considerably larger scantling than the others, and are driven home as tightly as possible on all sides. The holes receiving the bolts, except those receiving the middle pair, are all more or less elliptical in the direction of the expansion and contraction and receiving bolts that fit perfectly close laterally are packed well at the ends with vulcanised India rubber.

This rail seems to us to combine within itself considerable improvements in the present system of fastenings; but what is still more pertinent, it combines all the conditions obtained from the consideration of the theoretical full-service rail. The section given in illustration of our invention is intended to represent a 'chair-rail' of the same cost as

an ordinary 48 lb. rail, including the cost of chairs; whereas in point of strength it may probably be held to represent a wrought rail of the ordinary form weighing some 90 lbs. a yard.—The hollow bearer ensures an amount of strength considerably higher than a solid bearer of the same quantity of material—higher under certain conditions, by 40 p. ct. The hollow rails in use do not possess this advantage, seeing that the whole is not a continuous material in section. The cast part of this chairrail is expected to wear out several sets of the wrought part, making, while the first cost is considerably less and the wear reduced to the simple effects of friction, the relaying of the track a mere trifle in comparison with the loss sustained in replacing the present heavy rails after the small amount of service which oblige companies to dispose of them at some 50 per cent. under cost. A great deal might be said in recommendation of this rail; but as such remarks are unnecessary for the present only so far as they are calculated to bring the invention into fair working trial we prefer letting the rail stand here on its own merits without further remark than that it is a fair deduction from a theoretical speculation; which if it be not faulty in its premises must entitle the rail to an impartial trial from every intelligent Engineer who has honestly at heart the interest of his employers.

We claim under this modification of the rail the right to the dowel fastenings the rubber packing, for expansion and contraction, the combination of cast and wrought metal in rails, and the hollow form, however it may be diversified in either wrought or cast iron, in either chair or rail.

M. B. H.

**Engineer of the Virginia & Tennessee R.R.**

The announcement of the election of an Engineer in Chief, by the Board of Directors of the Virginia and Tennessee railroad, was made during our absence, in the last number of the *Virginian*. We avail ourselves of the first opportunity, on resuming our post, to bear cordial testimony—based upon long and intimate acquaintance, to the very great private and professional worth of the gentleman honored by the choice of the Directors. It would, where he is personally known, be not only supererogatory, but impertinent, in us to testify to the high sense of true honor, the sterling integrity, the amiable disposition and courteous manners, which have endeared Col. Garnett to a large circle of friends. In his profession, though comparatively young, he has had great experience and success, and, as the Engineer in Chief of several important works in the South, has acquired a high and well deserved reputation. Seven years ago, when that reputation was less established than it is at the present moment—without solicitation, or even a knowledge of the vacancy, on his part—he received from the Governor of Georgia the appointment of Chief Engineer of that State. His appointment as Engineer of the Hiwassee Rail Road, from a host of distinguished competitors for the honor, is a striking testimony to his professional merits. Circumstances, which reflect honor upon his character, led him lately to resign the office, and thus left him unemployed, and willing, we hope to accept the situation to which he is now called. We believe it would be difficult for our board to make a choice better calculated to inspire confidence in the great enterprise in hand. We say this not the less readily, in that our preferences were for another gentleman, whom, public opinion had designated as a prominent candidate, but who thought proper not to allow his name to be presented to the Board in connection with the office.

—*Lynchburg Virginian*.

ON A PAR OF \$100 ACCORDING TO THE LATEST SALES.—CORRECTED EVERY WEDNESDAY.

| NAME OF COMPANY.          | Length of line. | Length of branches. | Miles finished. | Cost of road and equip-ment. | Cost per mile. | Capital stock paid in. | Debits more than sur-plus | Rating grade.   | Earnings 1848. | Expenses 1848. | Net earn-ings 1848. | Rate of divi-idend in 1848. | Price of shares.            | Remarks. |
|---------------------------|-----------------|---------------------|-----------------|------------------------------|----------------|------------------------|---------------------------|-----------------|----------------|----------------|---------------------|-----------------------------|-----------------------------|----------|
| Atlantic and St. Lawrence | 146             | ...                 | 36              | In progress                  | s. ....        | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | 78 a 81                     |          |
| Androscoggin & Kenneb.    | 55              | ...                 | 6               | In progress                  | s. ....        | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | 70                          |          |
| Albany and Schenectady.   | 16½             | ...                 | 16½             | \$1,606,196                  | 100,000        | ...                    | ...                       | ..              | ...            | ...            | ...                 | 1 5-9                       | 89                          |          |
| Auburn and Rochester...   | 78              | ...                 | 78              | 2,644,520                    | 34,000         | ...                    | ...                       | ..              | 175,922        | ...            | ...                 | 8                           | 86a87                       |          |
| Auburn and Syracuse...    | 26              | ...                 | 26              | 1,125,886                    | 43,300         | ...                    | ...                       | ..              | 454,721        | ...            | ...                 | 2 9-10                      | 80a81                       |          |
| Attica and Buffalo...     | 31½             | ...                 | 31½             | 821,313                      | 26,000         | ...                    | ...                       | ..              | 172,185        | ...            | ...                 | 4½                          | ...                         |          |
| Alleghany Portage...      | 36              | ...                 | 36              | ...                          | ...            | ...                    | ...                       | ..              | 150,959        | ...            | ...                 | ...                         | ...                         |          |
| Albany and W. Stockb...   | 38½             | ...                 | 38½             | 1,924,701                    | 50,000         | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | Leas'd to Western railroad. |          |
| Annapolis and Elkridge..  | 21              | ...                 | 21              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Bangor and Oldtown...     | 11½             | ...                 | 11½             | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Boston and Lowell...      | 25½             | 1½                  | 27½             | 2,013,687                    | 73,200         | 1,800,000              | ...                       | 10 up, 30 down. | 461,339        | 268,707        | 192,631             | 8                           | 118½                        |          |
| Boston and Maine...       | 74½             | 5                   | 79½             | 3,571,832                    | 45,000         | 3,249,804              | 249,715                   | 47½             | 511,627        | 264,534        | 247,893             | 8½                          | 103½                        |          |
| Boston and Worcester...   | 41½             | 22                  | 66½             | 4,960,000                    | 74,700         | 4,500,000              | 460,000                   | 40              | 716,284        | 406,303        | 310,080             | 8½                          | 102½                        |          |
| Boston and Providence...  | 41              | 6½                  | 47½             | 3,031,106                    | 63,800         | 2,893,300              | 26,878                    | 37½             | 354,375        | 183,361        | 170,013             | 6½                          | 92                          |          |
| Bost., Concord and Mont.  | 90              | ...                 | 38              | In progress                  | s. ....        | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | 82a85                       |          |
| Berkshire...              | 21              | ...                 | 21              | 600,000                      | 28,500         | ...                    | ...                       | ..              | ...            | ...            | ...                 | 7                           | ...                         |          |
| Buffalo and Niagara...    | 22              | ...                 | 22              | 250,396                      | 11,500         | ...                    | ...                       | ..              | 60,014         | ...            | ...                 | 6 1-3                       | ...                         |          |
| Buffalo and Black Rock.   | 3               | ...                 | 3               | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Baltimore and Susqueh'a.  | 36              | ...                 | 36              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Beaver Meadow...          | 26              | ...                 | 26              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Buck Mountain...          | ...             | ...                 | 4               | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Baltimore and Ohio...     | ...             | 178                 | ...             | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Washington Branch...      | ...             | 31                  | ...             | 13,136,940                   | 61,900         | ...                    | ...                       | ..              | 1,468,825      | 805,530        | 663,198             | ...                         | 43½a44                      |          |
| Frederick Branch...       | ...             | 3                   | ...             | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Calais and Baring...      | 3               | ...                 | 3               | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Concord...                | 34              | ...                 | 34              | ...                          | ...            | 1,350,000              | ...                       | ..              | 311,326        | 180,699        | 130,639             | ...                         | 121                         |          |
| Cheshire...               | 54              | ...                 | 54              | 2,584,143                    | 48,000         | 1,453,379              | 1,140,764                 | 60              | ...            | ...            | ...                 | ...                         | 67a67½                      |          |
| Connecticut and Passump.  | 115             | ...                 | 40              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | 79½                         |          |
| Connecticut River...      | 50              | 2                   | 52              | 1,589,184                    | 30,500         | 1,234,970              | 426,013                   | 32              | 165,242        | 95,658         | 69,583              | 8                           | 96½                         |          |
| Cape Cod Branch...        | 28              | ...                 | 28              | 587,116                      | 20,900         | 343,000                | 217,395                   | 40              | ...            | ...            | ...                 | ...                         | 62                          |          |
| Corning and Blossburgh..  | ...             | ...                 | 40              | ...                          | ...            | ...                    | ...                       | ..              | 18,069         | ...            | ...                 | ...                         | ...                         |          |
| Cayuga and Susquehanna    | 29              | ...                 | 29              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Camden and Amboy...       | 61              | ...                 | ...             | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Trenton Branch...         | 6½              | ...                 | 96½             | 3,200,000                    | 33,000         | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | 140 a 142                   |          |
| New Brunswick Br...       | 29              | ...                 | ...             | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Columbia...               | 82              | ...                 | 82              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Camden and Woodbury...    | 9               | ...                 | 9               | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Cumberland Valley...      | ...             | ...                 | 52              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Carbondale & Honesdale.   | 26              | ...                 | 26              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Chesterfield...           | 12              | ...                 | 12              | 150,000                      | 13,500         | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| City Point...             | 9½              | ...                 | 9½              | 195,867                      | 15,919         | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Central of Georgia...     | 191             | ...                 | 191             | 3,222,289                    | 16,800         | ...                    | ...                       | 30              | 516,252        | 266,450        | 250,226             | ...                         | 80                          |          |
| Central of New Jersey...  | 63              | ...                 | 36              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Dorchester and Milton...  | 3½              | ...                 | 3½              | 114,224                      | 35,100         | 72,990                 | 41,234                    | 39              | ...            | ...            | ...                 | ...                         | 74                          |          |
| Detroit and Pontiac...    | 25              | ...                 | 25              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Eastern...                | 54              | 19½                 | 73½             | ...                          | ...            | ...                    | ...                       | 40              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Essex (Salem to Law.)...  | 22½             | ...                 | 22½             | 421,574                      | 18,700         | 263,746                | 160,958                   | 55              | ...            | ...            | ...                 | 8                           | 103                         |          |
| Erie and Kalamazoo...     | 33              | ...                 | 33              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Fall River...             | 42              | ...                 | 42              | 1,145,982                    | 27,300         | 1,050,000              | 83,177                    | 45              | 184,344        | 109,390        | 74,953              | 7½                          | 84½                         |          |
| itchburgh...              | 49½             | 6½                  | 56              | 2,945,630                    | 52,300         | 2,735,910              | 67,504                    | ...             | 486,265        | 286,046        | 200,219             | 8½                          | 109½                        |          |
| Franklin...               | ...             | ...                 | 22              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Greensville and Roanoke.  | 21              | ...                 | 21              | 283,917                      | 13,500         | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Germantown Branch...      | 6               | ...                 | 6               | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Gaston and Raleigh...     | 96              | ...                 | 96              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | 88 a 90                     |          |
| Georgia (Augusta to At'a) | 171             | ...                 | ...             | ...                          | ...            | ...                    | ...                       | 40              | 477,052        | 267,173        | 209,879             | ...                         | 121                         |          |
| Athens Branch...          | 39              | 310                 | ...             | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Harrisburg and Lancaster  | 37              | ...                 | 37              | 1,183,257                    | 31,979         | 609,550                | 573,707                   | 49              | 121,350        | 37,386         | 83,963              | 6                           | 96 a 97                     |          |
| Hartford and New Haven    | 62              | ...                 | 62              | ...                          | ...            | ...                    | ...                       | 17              | ...            | ...            | ...                 | ...                         | 104 a 105                   |          |
| Housatonic...             | 74              | ...                 | 74              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | 87                          |          |
| Hudson and Berkshire...   | 31½             | ...                 | 31½             | 818,983                      | 26,500         | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Hazleton and Lehigh...    | 10              | ...                 | 10              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Jackson and Brandon...    | 13              | ...                 | 13              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Lexington and W. Camb.    | 6½              | ...                 | 6½              | 252,680                      | 38,900         | ...                    | ...                       | 55              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Lowell and Lawrence...    | 12½             | ...                 | 12½             | 283,248                      | 22,650         | ...                    | ...                       | 45              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Long Island...            | 98½             | ...                 | 98½             | 2,173,646                    | 22,100         | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | 85                          |          |
| Lockport and Niagara...   | 23              | ...                 | 23              | 221,000                      | 9,700          | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | 21½                         |          |
| Lewiston...               | 3½              | ...                 | 3½              | 33,673                       | 10,300         | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Lykens Valley...          | 16              | ...                 | 16              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Little Schuylkill...      | 23              | ...                 | 23              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Louisa...                 | 50              | ...                 | 50              | 474,137                      | 9,482          | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Lexington and Frankfort.  | 29              | ...                 | 29              | 450,000                      | 15,600         | 300,000                | ...                       | 61              | 50,000         | 30,000         | 10,000              | ...                         | 82a85                       |          |
| Little Miami...           | 84              | ...                 | 84              | 1,513,402                    | 18,000         | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Machiasport...            | 8               | ...                 | 8               | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Morris and Essex...       | ...             | 45                  | ...             | ...                          | ...            | ...                    | ...                       | 80              | ...            | ...            | ...                 | ...                         | 100                         |          |
| Mauch Chunk and R. Run    | 36              | ...                 | 36              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Mine Hill & Sch. Haven.   | 25              | ...                 | 25              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | 136                         |          |
| Mount Carbon...           | 7               | ...                 | 7               | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Mt. Carbon & Pt. Carbon   | 2½              | ...                 | 2½              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Mill Creek...             | 6               | ...                 | 6               | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |
| Montgomery & W. Point     | 67              | ...                 | 67              | ...                          | ...            | ...                    | ...                       | ..              | ...            | ...            | ...                 | ...                         | ...                         |          |



ON A PAR OF \$100 ACCORDING TO THE LATEST SALES.—CORRECTED EVERY WEDNESDAY.

| NAME OF COMPANY.                 | Length of line. | Length of branches. | Miles finished. | Cost of road and equipment. | Cost per mile. | Capital stock paid in. | Debits more than surplus. | Ruling grade. | Earnings 1846. | Expenses 1846. | Net earnings 1846. | Rate of dividend in 1846. | Price of shares. | Remarks.  |
|----------------------------------|-----------------|---------------------|-----------------|-----------------------------|----------------|------------------------|---------------------------|---------------|----------------|----------------|--------------------|---------------------------|------------------|-----------|
| Madison and Indianapolis         | 86              |                     | 86              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Mad River and Lake Erie          | 102             |                     | 102             |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Mansfield and Sandusky.          |                 |                     | 56              | \$1,106,121                 | 19,700         |                        |                           |               |                |                |                    |                           |                  |           |
| Michigan Central.....            |                 |                     | 221             |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Michigan Southern.....           |                 |                     | 70              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Tecumseh Branch.....             | 10              |                     |                 |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Macon and Western.....           |                 |                     | 101             | 328,091                     | 6,218          |                        |                           | 30            | 140,970        | 63,243         | 78,722             |                           | 48a48½           |           |
| Mississippi.....                 |                 |                     | 30              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Nashua and Lowell.....           |                 |                     | 14½             | 525,063                     | 36,200         | 525,000                |                           | 13            | 169,187        | 109,599        | 59,588             | 10                        |                  |           |
| Northern (Ogdensburg).....       |                 |                     | 12              | In progress.                |                |                        |                           |               |                |                |                    |                           |                  |           |
| " (Concord to Leb'n.).....       | 69½             |                     |                 | 2,762,500                   | 34,000         |                        | 129,978                   |               | 408,455        | 241,370        | 167,277            |                           | 70a71            |           |
| Bristol Branch.....              | 12½             |                     | 81½             |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| N. Bedford and Taunton.....      |                 |                     | 20              | 499,065                     | 24,998         | 400,000                |                           | 40            | 136,151        | 96,220         | 39,225             | 6                         |                  |           |
| Norfolk County.....              |                 |                     | 26              | 621,488                     | 23,900         | 414,256                |                           | 35            |                |                |                    |                           |                  |           |
| N.Y. & N. Haven (14 mls. Har RR) |                 |                     | 62              |                             |                |                        |                           |               |                |                |                    |                           |                  | 33a34     |
| New Haven Canal.....             |                 |                     | 28              |                             |                |                        |                           |               |                |                |                    |                           |                  | 90a91½    |
| Norwich and Worcester..          | 59              | 7                   | 66              | 2,187,829                   | 33,100         |                        |                           | 32            | 218,073        | 170,297        |                    |                           | 36               |           |
| New York and Harlem..            |                 |                     | 80½             | 3,579,567                   | 44,600         |                        |                           |               |                |                |                    |                           | 53½              |           |
| New York and Erie.....           |                 |                     | 200             |                             |                |                        |                           |               |                |                |                    |                           | 60½              |           |
| New Jersey.....                  |                 |                     | 29              |                             |                |                        |                           |               |                |                |                    |                           |                  | 108 a 110 |
| Newcastle & Frenchtown           |                 |                     | 17              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| N. Orleans and Carrollton        |                 |                     | 5½              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Old Colony.....                  | 37½             | 7½                  | 45              | 2,080,903                   | 46,200         | 1,601,415              | 683,648                   | 40            | 227,350        | 139,592        | 87,757             | 6½                        | 78               |           |
| Oswego and Syracuse.....         |                 |                     | 41              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Portland, Ports, and Saco.       | 51              |                     | 51              | 1,350,000                   | 26,400         |                        |                           |               |                |                |                    | 6                         | 95               |           |
| Peterboro' and Shirley...        | 12              |                     | 12              | 208,311                     | 17,300         |                        |                           |               |                |                |                    |                           |                  |           |
| Pittsfield and N. Adams.         | 18½             |                     | 18½             | 447,755                     | 24,000         |                        |                           | 66            |                |                |                    |                           |                  |           |
| Providence and Worcester         | 43½             |                     | 43½             | 1,873,895                   | 43,000         |                        | 573,058                   | 26            | 193,844        | 83,889         | 109,954            |                           | 82½              |           |
| Paterson and Hudson R..          | 16½             |                     | 16½             |                             |                |                        |                           |               |                |                |                    |                           |                  | 110a111   |
| Philadelphia and Trenton         | 28              |                     | 28              |                             |                |                        |                           |               |                |                |                    | 10                        | 130 a 140        |           |
| Philad. Wilm. and Balt..         | 97              |                     | 97              | 6,173,851                   | 66,000         |                        |                           |               | 638,142        | 382,608        |                    |                           | 54               |           |
| Philadelphia City.....           | 6               |                     | 6               |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Philad. Germ. and Nor..          | 17              |                     | 17              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Philadelphia and Reading         | 93              |                     | 93              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Penn Township.....               | 2               |                     | 2               |                             |                |                        |                           |               |                |                |                    |                           |                  | 36½       |
| Petersburg.....                  | 59              |                     | 59              | 946,361                     | 16,040         |                        |                           |               | 163,092        | 87,131         |                    |                           |                  |           |
| Ponchartrain.....                | 4½              |                     | 4½              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Pt. Hud., Jack. and Clint.       | 28              |                     | 28              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Rensselaer and Saratoga.         | 25              |                     | 25              | 661,910                     | 26,400         |                        |                           |               |                |                |                    |                           |                  |           |
| Ramapo and Paterson....          | 15              |                     |                 |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Rich. Fred. and Potomac.         | 75½             |                     | 75½             | 1,474,004                   | 19,459         |                        |                           |               |                |                |                    |                           |                  | 80        |
| Richmond and Petersburg          | 22              |                     | 22              | 877,484                     | 39,886         |                        |                           |               | 206,858        | 100,568        |                    |                           |                  |           |
| Sullivan.....                    | 28              |                     | 28              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| South Shore.....                 | 11½             |                     | 11½             | 255,748                     | 22,200         | 135,935                | 128,075                   | 35            |                |                |                    |                           |                  | 33½       |
| Stony Brook.....                 | 13              |                     | 13              | 246,659                     | 19,000         | 216,829                | 29,189                    | 40            |                |                |                    |                           |                  |           |
| Stonington.....                  | 50              |                     | 50              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Saratoga and Washington          | 40              |                     | 40              | 948,372                     | 23,700         |                        |                           |               |                |                |                    |                           |                  | 54        |
| Syracuse and Utica.....          | 53              |                     | 53              | 1,968,036                   | 37,060         |                        |                           |               |                |                |                    |                           |                  |           |
| Schenectady and Troy...          | 20½             |                     | 20½             | 659,668                     | 32,100         |                        |                           |               | 677,671        |                |                    |                           |                  | 120 a 121 |
| Saratoga and Schenectady         | 22              |                     | 22              | 331,036                     | 15,000         |                        |                           |               | 47,025         |                |                    |                           |                  |           |
| Summit.....                      | 2               |                     | 2               |                             |                |                        |                           |               | 57,018         |                |                    |                           |                  |           |
| Schuykill Valley.....            | 14              |                     | 14              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Shamokin.....                    | 22              |                     | 22              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Swatara.....                     | 4               |                     | 4               |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Seaboard and Roanoke.            |                 |                     | 76½             | 1,519,140                   | 20,460         |                        |                           |               |                |                |                    |                           |                  |           |
| S. Carolina Main Stem )          | 136             |                     |                 |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Columbia Branch..... )           | 68½             | 242                 |                 | 5,943,678                   | 24,500         |                        |                           |               |                |                |                    |                           |                  |           |
| Camden Branch..... )             | 37½             |                     |                 |                             |                |                        |                           |               | 800,073        | 308,802        | 401,271            |                           |                  |           |
| Sangamon and Morgan..            | 56              |                     | 26              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Taunton Branch.....              |                 |                     | 11              | 305,085                     | 27,600         | 250,000                |                           | 35            | 108,101        | 90,485         | 17,615             |                           |                  |           |
| Tonawanda.....                   | 43½             |                     | 43½             | 974,865                     | 22,400         |                        |                           |               | 218,301        |                |                    |                           |                  |           |
| Troy and Greenbush.....          | 6               |                     | 6               | 273,625                     | 45,900         |                        |                           |               | 60,055         |                |                    |                           |                  |           |
| Tuckahoe & James River           | 4½              |                     | 4½              | 69,322                      | 14,999         |                        |                           |               |                |                |                    |                           |                  |           |
| Tallahassee and Port L..         |                 |                     | 26              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Tuscumbia and Decatur.           |                 |                     | 44              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Utica and Schenectady..          | 78              |                     | 78              | 3,161,688                   | 40,500         |                        |                           |               |                |                |                    |                           |                  |           |
| Vermont and Mass.....            | 69              |                     | 69              |                             |                |                        |                           | 55            | 795,239        |                |                    | 10                        | 123a125          |           |
| Vermont Central.....             | 121             |                     | 69              | In progress.                |                |                        |                           |               |                |                |                    |                           | 40a41            |           |
| Vicksburg and Clinton..          |                 |                     | 46              |                             |                |                        |                           |               |                |                |                    |                           | 47½              |           |
| Western.....                     | 117½            |                     | 117½            | 7,975,452                   | 67,700         |                        |                           | 83            | 1,332,068      |                |                    |                           | 7½               |           |
| West Stockbridge.....            | 2½              |                     | 2½              | 41,515                      | 15,000         |                        |                           |               |                |                |                    | 8                         | 102a103          |           |
| Worcester and Nashua..           | 45              |                     | 45              |                             |                |                        |                           | 48            |                |                |                    |                           |                  |           |
| Wrights, York & Gettys.          |                 |                     | 13              |                             |                |                        |                           |               |                |                |                    |                           |                  | 50a51½    |
| Whitehaven and Wilkes.           |                 |                     | 20              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Williamsport and Elmira          |                 |                     | 26              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Westchester Branch.....          |                 |                     | 10              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| West Feliciana.....              |                 |                     | 24              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Winchester and Potomac.          |                 |                     | 32              | 509,415                     | 15,919         |                        |                           |               |                |                |                    |                           |                  |           |
| Wilmington and Weldon            |                 |                     | 163             |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Westminster Branch.....          |                 |                     | 10              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |
| Western and Atlantic....         |                 |                     | 100             | In progress.                |                |                        |                           |               |                |                |                    |                           |                  |           |
| York and Maryland Line.          |                 |                     | 21              |                             |                |                        |                           |               |                |                |                    |                           |                  |           |

## AMERICAN RAILROAD JOURNAL.

Saturday, July 21, 1849.

**To the Mechanicians of the United States.**

We propose, in the first place, to publish in this Journal *without any charge* full explanations of the crack engines turned out of such workshops as furnish us with the necessary number of plates, showing the details of the same; and we further propose if this appeal to the mechanical pride of America supply us with a sufficient number of extra copies of those plates to exchange with English journals for an equivalent number of similar plates furnished by them for the information of our readers. This scheme will give us means of showing the world the best specimens turned out by our workshops; and of showing ourselves the best and latest specimens from the workshops of Great Britain. This will make up in a great degree for the want of association amongst our practical men, and place them all in closer professional character. The exchange with drawings from English periodicals, is however to be a matter of treaty but before entering on it we must first learn how far our plan meet with the support of the machinists of this country.

The personal interests of manufacturers in having laid before the public the best models of their skill is so very evident that we feel some confidence in urging on them this proposal for the advancement of our country—a proposal, in which, by waving on our own part all interested considerations, we seek to call forth the self-sacrificing nationality of the country in the generous struggle we encourage for mechanical supremacy.

**James River and Kanawha Company.**

Our readers will see, by reference to our advertising columns, that this company are about to unite their canal with tide water at Richmond.—This is a work which has long been desirable, and must greatly increase the usefulness of the canal.

**Railroad to the Pacific.**

Mr. Whitney in his road proposes the construction of one of the greatest, if not the greatest work, ever attempted in any age. Experience does not furnish an example of a similar kind to serve as a guide in this. In the absence of any such guide, one great objection we have made to Mr. Whitney's plan is, that it does not contain any proper evidence of its practicability. The first step in the commencement of every railroad, as the basis of all future action, is to ascertain the physical difficulties to be encountered. These can only be determined from actual survey. The opinion of a person who has no experience as an engineer, nor of the working details of railways, is entitled to but little weight in these matters. The highest authority for most of the propositions laid down by Mr. W., are his own statements, which lack the necessary conditions to give them authoritative value. The practicability of his plan, therefore, is yet to be proved. All we contend for is, that this should be subjected to the ordinary tests by which the feasibility of any similar work is determined. If these tests decide in his favor, we will do all in our power to aid him. If against him, the sooner its impracticability is demonstrated, the better for himself and the public.

The objections we have thus far urged against the scheme relate to his estimate of its cost. These objections must be general in their nature, because we have only a general knowledge of the route.—We are furnished with no estimates in detail. The cost of other roads can furnish a criterion of cost of this, only so far as the circumstances of each

agree. We cannot see that Mr. Whitney's road has any advantage over any other well built road in this country, except in the cost of grading. By this we mean that the route proposed by him will require less excavation than an average of our roads. But we by no means admit that even this item will cost him less than the average cost of the grading of roads in the old states, for reasons, which, we think, must be apparent to all. On the other hand, every other item that makes up the expense of a road, must cost him vastly more than any road yet built. Nearly the whole of his route runs through an unsettled country. Can he transport from the older states all the material for his road at any reasonable expense and any reasonable time? We believe this to be impossible. The world is full of failures of works, attempted where the conditions necessary for their success did not exist when they were commenced. A manufacturer in New England will make money, when by pursuing the same business in any other part of the country he would certainly fail. The reason of this is perfectly plain. In the one case, whatever he requires to carry on his business is furnished at call. In other parts of the country he must be at the expense of educating his workman, and of preparing all his material at his own expense. Why did so many of the Western States a few years since suffer such disastrous failures in their attempts at internal improvements? Certainly not for the want of sufficient money to have ensured success to undertakings of equal magnitude in the older states. What has Illinois or Mississippi to show for the immense amount of their state debts? Nothing. They commenced their works before they had reached the conditions necessary to success—before they had sufficient population to furnish labor or skill to direct them. These states offer much better facilities for railroad construction than the route over the prairies. In Illinois, immense sums were expended by the state upon lines of road which have been utterly abandoned. Here we witness not the failure of an individual, but a state. When she commenced her works, she enjoyed unlimited credit, and every one supposed her schemes practicable.—But they turned out to be of the most visionary kind. And, so signal was her failure, that she repudiated her former policy, and all connection with works of internal improvement. Since her disasters, some twelve years have elapsed, during which time her population has nearly quadrupled. Her people are now feeling that they possess some of the elements necessary to success in undertaking public works. Companies are now recommending the construction of railroads in every part of the state, which are progressing as fast as means can legitimately be obtained, and the ability and settlement of the country justify their construction. It cannot be doubted but that if Illinois had postponed her works of internal improvement ten years she would have accomplished vastly more than she has done. Time is the great element to be respected in undertaking public works in the west. It is time alone that can give the conditions essential to success. Mr. Whitney must surmount all these difficulties which have proved insuperable to states which possessed vastly greater facilities for those works than his route possesses. They had a sparse population, unbounded means, and an abundance of material for the superstructure of their roads at hand. All these he leaves at the commencement. Every succeeding mile costs more than the first. In addition therefore to the increased expense of his road, from lack of inhabitants along its line, which every one

will readily appreciate, he must incur the expense of transporting all the material necessary for his road, for building the houses and fences of settlers, for every thing, in fact, which they must use or wear; and in the outset, food for their subsistence. Transportation over his road, adopting the average of New England roads, will cost 17½ mills per ton per mile. How much this will add to the cost of a road extending even to the stone used, we leave to people to judge for themselves.

But it may well be questioned whether so long as we have immense tracks of wooded land well situated for sale, people can be induced to go 500 miles into a prairie, even the on line of a railroad, where they will be compelled to purchase and transport this distance, every particle of wood they use for fuel, for agricultural purposes, and for building; to say nothing of the other necessities of life, which they would be obliged to obtain in the same way. Wood is an article of first necessity in the economy of life, and settlements never can go far beyond its line.—It can be easily cultivated, however, but it requires some twenty years to give it sufficient size for use. The settlement of that part of the route over fertile lands therefore, can only proceed so fast as wood can easily be obtained for the use of the inhabitants either from the native or cultivated forests.

Mr. Whitney asserts that the settlement of the country and the road must proceed with equal steps. In reference to this connection he says:

*"Now an entire wilderness, it becomes absolutely necessary to connect the settlement of the country on the line with the construction of the work, being impossible without it."*

The road therefore cannot cross the prairies till they are fitted in some degree for settlement by introduction of wood upon them. Even if it were possible to push the settlements in advance of this over the fertile districts, he admits that there is about 800 miles of his road of poor land not fit for cultivation, and consequently uninhabitable except by Nomadic tribes. Thus taking all his statements as proved, they involve a contradiction on their very face, and the very argument he lays before the public in support of his plan contains his admissions of its impossibility.

**Mechanical Agents.****STEAM.**

In last week's number was furnished a table and rule for ascertaining the elastic force of steam at its several degrees of temperature, both intended to apply to steam in contact with water or as it is called saturated steam. We will now go into the elastic force of steam when *not* in contact with its water of generation, and for this purpose take leave to explain in the first instance the phenomena and laws of *latent heat*.

Some bodies require a greater amount of heat than others to raise their temperature to a certain point out the thermometer, this property of bodies being termed their *capacity of heat*. The heat given out, or rather the effective heat employed to raise such bodies to a given temperature, consists therefore of two parts: the heat which is made evident to us by the thermometer, or *specific heat* and that which is chargeable to the absorbing power of the body or *latent heat*; and which, unlike the *specific heat*, cannot be made directly evident to our senses. To illustrate this more fully: water placed in an open vessel on a fire begins to give out steam when its temperature, assumed to have been originally 20°, is increased to 100°; and though the 80° of heat acquired be acquired in suppose 15 minutes, we find that no further increase goes on while the steam is



allowed to pass out of the vessel. From this it is evident that the steam escaping carries with it the heat given out above this point by the heating surface; and as by closing the vessel the heat is retained, increasing at the same rate for every 15 minutes after it reached 100°, while the thermometer fails to give a temperature corresponding to such increase the difference establishes clearly the principle and amount of latent heat. Latent heat is measured in the same way as specific or apparent heat—in terms of an unit whose value is the heat necessary to raise the temperature of a given quantity of water one degree. Dr. Ure's experiments give results that form an average of many others, and seem from the manner of conducting them something more trustworthy than the rest: these show the total amount of heat necessary to evaporate water under the pressure of one atmosphere or 14.75 lbs. avoirdupoise to be 637.5. The total heat required to evaporate a given quantity of water is found to be different under different pressures of the steam to be generated; and as this furnishes the means of fixing the area of heating surface in steam engines to produce a certain amount of vapor at a certain pressure it may be useful to go into the question at some length.

Practical men generally calculate the area of heating surface according to the Law of Watt, that is to say that the amount of heat necessary to evaporate a pound of water is the same under all pressures; but though this may be found to lead to no serious error in practice, we had better, as Watt's law is not true, furnish a means of closer approximation. M. Regnault has deduced from a series of very careful experiments a formula for the total amount of heat necessary to convert a pound of water into saturated steam at a given pressure, and as the two first terms of his expression give an approximation to the truth sufficiently exact in practice he adopts the following form:

$$H = A + B T$$

Where H is the total heat, T the apparent heat or temperature, A and B constant coefficients found by experiment to be, the first 606.5, the second 0.305 for degrees on the Centigrade thermometer. To put this rule into an expression still more popular:—To the constant quantity 606½ add 3.05 for every 10 degrees of the temperature corresponding to the given pressure, and the sum will give the total heat necessary to convert a certain quantity of water into steam of that pressure. As a more convenient reference we copy the following table of results calculated by M. Regnault from the foregoing rule:

*Heat required to convert water into saturated steam at different pressures.*

| Temperature of saturated steam. | Total heat in Centigrade degrees. |
|---------------------------------|-----------------------------------|
| 100                             | 637.0                             |
| 110                             | 640.0                             |
| 120                             | 643.1                             |
| 130                             | 646.1                             |
| 140                             | 649.2                             |
| 150                             | 652.2                             |
| 160                             | 655.3                             |
| 170                             | 658.3                             |
| 180                             | 661.4                             |
| 190                             | 664.4                             |
| 200                             | 667.5                             |

The only remark necessary to be added in illustration of the above table is simply that the difference between the two columns—between the total and the apparent heat—is of course the amount to be charged to the head of latent heat.

Steam in contact with its water of generation increases in elastic force with the increase of its density and of its temperature, but in steam removed

from its water of generation the density always remaining constant, the increase of its elastic force arises simply from its increase of temperature. According to the law of Mariotte (see remarks on the diving-bell in the Journal for June 30th) steam is found to expand for every degree of heat 1.459th of its original bulk.

M. B. H.

For the American Railroad Journal.

#### Steele & Middleton's Compound Bridge Rail.

Without intending to partake in any discourse which may arise on the merits of different plans of railway superstructure, or desiring to intrude my views on the public, I take this occasion of correcting some of the mis-understandings which M. B. H. seems to have as to the general arrangement of the Compound Bridge Rail.

It is not the intention to use Chairs, necessary as they may be to most plans of track, they are evils, and should not be used except to correct other evils of a more serious character.—Neither is it intended to use Longitudinal bearings, but simply to spike the rails down with common hook head spikes to cross sleepers notched half an inch deep to receive their base, and resting on thorough ballast at intervals of 2½ feet.—This is a sufficient answer to all objections as to gauge; rails notched into cross sleepers do not loose their gauge, the difficulties in that respect being confined to other arrangements. Probably rivets will prove better than screws for fastening the several parts of the rail together, it is therefore proposed to use them made of half inch round iron, passing horizontally through the centre at intervals of four feet, these can be tightened up as frequently as occasion may require, or it may be that practice will point to some better fastening.

As regards lateral strength, if the front or Z shaped piece is turned on its side and considered as a beam to resist cross strain, it will be found stronger than many H. rails which answer a good purpose; but we get a large increase of strength by bolting a second piece to it, and thus from a combination similar to a built girder, its power therefore to resist the transverse action of Machinery cannot be doubted and the objection is supposed to be to the joints which, if compared with any of the usual joint fastenings will be found to exceed them in security; in fact the joint cannot become deranged without the T piece or one half the rivets in the bar first being destroyed.

Some objections is made to the new arrangement of the lamina in the metal, owing to the irregularity of the shape. If we examine the lamina of the ordinary bridge rail we shall find they are curved on the top, forming a series of arches against the tread of the wheels, of about 90 degrees, crossing the vertical sides of the rail at angles of about 45° and again reversing their curve to pass into the base; and it is this arch shaped lamina on the top which gives the bridge rail its peculiar wearing property. It will be at once seen that the position of the lamina of the Z piece will nearly correspond to that of the bridge rail and thus possesses to a large extent its valuable characteristics.

The Z is not a new shape for rails, as is generally known it has been many years in successful use in Maryland though differently arranged, and the supposed difficulties as to the upsetting process, and the imperfect fitting of the several parts of the rail are also there being tested by practice, the only true guide to railway tracks.

J. D. S.

The above communication is laid before the public with a view to full justice in the case of Messrs. Steele & Middleton's compound bridge rail; and as we do not think it necessary to add any remark of our own in this place on the subject, we will simply

leave the question as it stands now before the public. We thank "J. D. S." very sincerely for having received our remarks in their proper spirit; and for helping out by this defence of his ingenious invention our views for the promotion of candid discussion on the several questions occurring in the progress of mechanical improvements.

In discussing the question of permanent way our own attention has been directed this week to an improvement in rails; and as we lay the result of our labors in the case before the public, beg leave to express the pleasure with which we shall publish any remarks on the subject from J. D. S., or any other gentleman who like him, appreciating the advantages of such discussion, can enter into their proper spirit.

M. B. H.

#### Maine

The following gentlemen were chosen officers of the Androscoggin railroad on Tuesday last:—

William Kilbourne of Auburn, President; John Gilmore of Leeds, Treasurer; Ozias Milleet, of Leeds, Clerk.

Directors—William Kilbourne, Auburn; Ensign Otis, Leeds; Giddings Lane, Leeds; David Benjamin, East Livermore; Ezekiel Treat, East Livermore; Elisha Keys, Jay; William Calden, Wilton.

#### Vermont and Massachusetts Railroad.

The mortgage bonds of the Vermont and Massachusetts Railroad Company, bearing interest at six per cent, to the amount of \$300,000 were put up at auction on Saturday last, by Brown & Sons. The whole amount of the company's debt was stated at \$1,100,000 and the security at about \$800,000.—The road now earns \$13,000 a month, and this will be largely increased by its prospective trade. The conditions of the sale were 25 per cent. upon par, payable July 19. and 25 per cent. in two, four and six months—with interest from July 1. The first sale was \$10,000 at 88 per cent. after a brisk bidding. Lots were then taken, one of \$85,000, then of from \$20,000 to \$5,000, and from thence to 1000 at 87 per cent. About \$230,000 of the par issued were taken at that price, and offers of 86½ were made and rejected. Perhaps the whole might of been sold had it been known beforehand that the price was to be restricted.

#### Improvements in Manufacturing Metallic Tubes.

Mr. J. O. Yorke has just patented a process by which he proposes to cast iron or steel tubes in thick short lengths, which are afterwards to be rolled out to the requisite thickness by being placed upon a mandrel of rather less diameter than the bore of the intended tubes, and passed while in a heated state between a pair of rollers furnished with a number of grooves on their peripheries, which are of gradually decreasing diameter. Or, the short tubes may be slid on to a fixed mandril, which is supported in the grooves of a series of pairs of rollers, and made at those parts which are the grooves thicker than elsewhere, but not quite equal to the diameter, of the bore of the intended tube. The diameter of the grooves of each pair of rollers decrease gradually till the last, which is equal to that of the exterior circumference of the tube. The thick tube is slid up to the first pair of rollers, which seizes hold of it, partially compresses it, and passes it on to the next pair, which does the same, and so on through the series. At each succeeding operation the tube is shifted one fourth round, in order that the roller may act upon different portions of the tube successively. The thick short iron tubes may be

formed of bars with bevelled edges, bent round a rod, and welded together when on the mandril by the action of the first pair of rollers. The patentee proposes, lastly, to change the form of the flues in tubular boilers, from a circular into an oblong or rectangular one, by drawing them while hot, through a die-plate, which shall have the effect of pressing the sides together, and consequently of decreasing their area without decreasing their heating surface.—**Claims:** 1. The mode, or modes, of manufacturing iron and steel tubes, by rolling or pressing thick short cylinders of these metals upon a straight mandril, between a pair of grooved rollers.—2. The mode, or modes, of manufacturing iron and steel tubes by rolling or pressing thick short cylinders of these metals over and upon a stationary mandril, between a series of pairs of grooved rollers.—3. The mode of decreasing the area without decreasing the surface of flues in tubular furnaces.

#### Georgia.

The following is a list of the cotton factories in this state, copied from the Macon Journal:

| Planters'         | Factory in | Upson County. |
|-------------------|------------|---------------|
| Wayman's          | do         | do            |
| Thomaston         | do         | do            |
| Flint River       | do         | do            |
| Columbus          | do         | Muscogee      |
| Howard            | do         | do            |
| Coweta            | do         | do            |
| Carter's          | do         | do            |
| Winter's          | do         | do            |
| Augusta           | do         | Richmond      |
| Richmond          | do         | do            |
| Bellville         | do         | do            |
| Princeton         | do         | Clarke        |
| Athens            | do         | do            |
| Georgia           | do         | do            |
| Scully Shoals     | do         | Greene        |
| Curtwright        | do         | do            |
| Broad River       | do         | Elbert        |
| Beaver Dam        | do         | do            |
| Anthony's Shoals  | do         | do            |
| Cedar Shoals      | do         | Newton        |
| Newton            | do         | do            |
| Roswell           | do         | Cobb          |
| Nickojack         | do         | do            |
| Rockmills         | do         | Warren        |
| Shoals of Ogechee | do         | do            |
| Sweet Water       | do         | Campbell      |
| Milledgeville     | do         | Baldwin       |
| Planters'         | do         | Butts         |
| Eatonton          | do         | Putnam        |
| Troup             | do         | Troup         |
| McDonough         | do         | Henry         |
| High Shoals       | do         | Morgan        |
| Bowen's           | do         | Carroll       |
| Trion             | do         | Chattooga     |
| Houston           | do         | Houston       |

In addition to the above, the requisite amount of stock has been subscribed for one factory in Macon, one in Augusta, one in Warren, one in Morgan, one in Gwinnett, and one in Monroe. Others have, no doubt, been spoken of, with which we are unacquainted, and which may be in operation in the course of the present year.

#### State Road—The Tunnel.

This Road, is rapidly progressing towards the Tennessee River. Georgia is to be the first Atlantic State, among many rivals, to reach by a continuous line of Railway, the navigable waters of the Tennessee River. The State road extends from Atlanta to Chattanooga on the Tennessee River, 138 miles. We are indebted to the Augusta Chronicle for the following statement, of its present condition. After speaking of the difficulties encountered on the work of Tunneling, it goes on to say;

All these and many more impediments will be surmounted, and the commerce of the great agricultural State of Tennessee and not a little of that of the upper Valley of the Mississippi, will soon pass under Tunnel Mountain, and begin to pay millions of tribute to Georgia enterprise and Georgia Statesmanship. Between the Tunnel and Chattanooga there are eleven considerable bridges, seven of which are framed and ready to rise, and four in a state of forwardness. Only seven miles of the road require to have the wood work placed upon it, which is ready. A dozen teams are hauling railroad iron over the mountain, and it will soon rest on the timber prepared to receive it. This done, a locomotive will be hauled by teams over the mountain, and run from the west aperture of the Tunnel to the Tennessee river. By the first of November the common highway travel between Knoxville and Augusta will not exceed half a mile. *We can steam five hundred miles from this city into about as fine a farming country as can be found on the continent, in the course of four months from this time.*

By going down instead of up the Tennessee river, land travel from Chattanooga to St. Louis, Chicago, Buffalo and Montreal, is only encountered at Muscle Shoals in north Alabama. The completion of the railroad Nashville will command for our benefit the trade and travel of the Cumberland river, and make it but a step to Illinois and Missouri.

#### The Public Works of England.

##### NO. II.—CANALS.

It may seem somewhat strange, that while canals of the greatest magnitude had been undertaken on the continent, England contented herself with scouring and deepening her rivers until the middle of the last century. The necessity, it must be owned, was not so stringent as in France. Yet the development of commerce in this country, long before the time we have mentioned, was sufficient to render almost necessary some better means of inland navigation than those afforded by our natural water-course. It is that the great southern towns, lying as they did either on large rivers or by the sea, did not require canals to the same extent as the cities of the northern and midland districts. As soon, therefore, as industry and enterprise had begun to assume importance in those parts of the island, the idea of forming canals to the various centres of manufactures followed as a matter of course; and in the year 1720 we find the first definite proposal for the execution of one of these important undertakings ever made in this kingdom. At the estuaries of the Aire and the Ribble, had attracted the attention of the enterprising men of Yorkshire and Lancashire. Various schemes were set on foot for carrying this project into execution, which resulted in an Act being obtained, in 1720, for the undertaking which has since ripened into the LEEDS AND LIVERPOOL CANAL.

Before however any practical progress was made towards the completion of this scheme, the Duke of BRIDGWATER commenced the execution of his own magnificent canal, under the supervision of Mr. Brindley. All other projectors now appear to have held back undone in the way of inland navigation between 1737 and 1761, during which 24 years the Bridgewater Canal was being carried through every obstacle and discouragement, by the indomitable genius of its engineer, to a triumphant completion. The history of that great work is too well known to be repeated here; but the more than doubts expressed concerning it, and the prophetic warnings of inevitable failure which were uttered on all sides during its progress, prove how little was at that time understood in this country respecting that class of undertakings; and they prove, too, how extremely slow was the first growth amongst us of that very enterprise which were afterwards destined to work out into such splendid development. The canal cost 220,000l.—an enormous sum at that time, and from the purse of a single individual. It is said that the duke of Bridgewater had to live for many years upon 400l. a year, in order to pay for it. The recompense has been no less remarkable. Long since the annual income netted by means of the canal was valued at 130,000l., and not withstanding the completion of a whole network of railways through the district it traverses, that return, it is believed, is at present considerably exceeded.

One single canal was commenced during the interval above-mentioned; and which, having been completed before the duke's, has the honour of being the first work of the kind executed in England. This was the Sankey Canal, running from the mouth of the Sankey Brook, in the Mersey, to St. Helen's. It is however little more than an improved edition of the long used-river navigation, as the brook is all along a feeder to the canal, which was by the side of it. Its length is not more than 12 miles, the fall about 78 feet, with eight single locks and two double ones, so that this first of our canal enterprise was no great work. Mr. John Eyes, of Liverpool, was the engineer.

The opening of the Bridgewater Canal gave a new impetus to this branch of enterprise. The Louth Canal got its Act in 1763, little more than a year after the opening of the Bridgewater. The greater part of this canal is on a continuous level, very little above the sea, running from the Humber, near Tetney Haven, to the River Ludd. The length is but 14 miles, and the original estimate 16,500l. It was so defectively constructed, notwithstanding the facilities of the country, that the whole affair, after 28,000l. above the estimate had been raised on loan, was assigned to a single man, Mr. Chaplin, to manage in his own way. This was the result of a too stringent economy, in starting. It took a long time to get public companies to understand their own interest. The Louth Canal is now a useful work, as far as it goes, and very beneficial to the town of Louth and the neighbourhood.

The next canal attempted—in fact, the third opened in the country—was, like the Bridgewater Canal the speculation of a single man. In 1764, Sir J. H. Duval cut a canal through the solid rock, for the purpose of connecting Hartlepool Harbour, in the county of Durham with the sea. The canal is about 300 yards long. The next canal was likewise a private undertaking, projected and executed by a single man. Mr. J. Rymer made a canal from his coal and lime works to the tideway in Kedvelly Harbour. He obtained his act in 1766. Long after in 1822, a company undertook to improve and extend the canal, construct tramroads in connection with it, &c., from which resulted the present Kidvelly Canal, with its branches and adjuncts.

Thus, out of the four canals first executed, three were strictly private. In 1766 the first really important public canal was commenced, the Staffordshire and Worcestershire. This work was engineered by Brindley himself, to proceed from the severn, at Stourport, to the Trent and Mersey navigation, near Haywood, in Staffordshire. Its rise is considerable, as upon the top level it runs for 16 miles at a height of 294 feet above the severn at Stourport, and of 352 feet above low water mark at Runcorn. In length it is almost 47 miles, and it cost 112,000l. including a variety of accessory expenses in clearing away shoals from the bed of the Severn. The trade on this canal is immense.

The Trent and mersey canal was commenced in 1766. It was suggested by the Duke of Bridgewater, with whose water communication it is at one point connected, and was executed up to the time of his death by Mr. Brindley. The original estimate was 130,000l., but it cost 334,000l. Little wonder for it comprises 127 aqueducts and culverts—one of the former over the River Dove being very extensive—91 locks, and 6 tunnels. The famous Harecastle tunnel, 2880 yards long, is situated on the summit level of this canal, whose total length is 93 miles.

The next undertaking in chronological order is one of the noblest works in the kingdom. The Forth and Clyde canal was begun in 1768. This canal, commencing in the Fort at Grangemouth harbour, passes within 2 miles of Glasgow, and thence into the Clyde, being the first realised attempt at connecting the two great seas of our island. Its length is 35 miles, and the greatest rise 155 feet. By the recent improvements it has undergone, sea-borne craft, drawing 10 feet water, are able to navigate through it, between the Irish Sea and the German Ocean. The locks are 74 feet long by 20 wide; they are 39 in number. On its course are 33 drawbridges 10 large aqueducts, and 33 smaller ones. Among its many reservoirs is one that covers 70 acres, with a depth of 22 feet at the sluice. The first idea of this undertaking dates as far back as the time of Charles II.—that monarch having taken preparatory measures for cutting a channel in the same direction for



the passage of Ships of war. The design was calculated to cost 500,000*l.*, but was far too magnificent for the impoverished exchequer of the Stuarts. In 1723 a fresh survey and estimate was made by a good engineer, Mr. Gordon, but nothing more was done until 1764, when Lord Napier employed Mr. Maskell to make a report, the result of which was, that the celebrated Smeaton was engaged to undertake the work according to the present plan. Sundry difficulties as usual, arose—the chief being the enormous enhancement of the cost. The estimates fixed this at 147,337*l.*, but when this had been expended, and between 70,000*l.* and 80,000*l.* additional borrowed, the projectors found that only about half the length had been, though with much rapidity, completed. Disputes then occurred with the engineer, amidst which the works stood still, but being presently recommenced, the canal was brought to within 6 miles of the Clyde, when its further progress was again stayed by the want of funds. An Act, passed in 1784, alleviated this difficulty, by enabling the proprietors to borrow money from the Scotch Barons of Exchequer, out of the forfeited estates, and with this assistance the work was completed in 1790. The whole stock amounted at last to 519,840*l.*—considerably beyond the sum estimated by Charles II. for his ship canal, and which, if mentioned at the beginning, would have stifled the project in its birth.

As a collateral assistance to the navigation of the Forth, the Borrowstouness Canal was commenced in the same year with the Forth and Clyde. It is a level canal, about 7 miles long, and cost 21,000*l.*, the original estimate having been 5000*l.* In the same year Brindley commenced the Coventry Canal, running from the Trent and Mersey to Coventry. The project appeared a failure for some time, as the requisite capital was not forthcoming. But the Trent and Mersey Company took the matter up in 1782, and the work was begun in earnest. It was finished in 1790, and forms with the Ashby-de-la-Zouch and Oxford Canals, which communicate with it, the longest canal line in England, being upwards of 70 miles, exclusive of branches. The length of the Coventry Canal is somewhat short of 38 miles, with very few locks, and a level at the highest of 81 ft. The expense was about 90,000*l.* Brindley's great object was to connect, by canal navigation, the ports of London, Liverpool, and Hull. The last link in this great chain was that grand undertaking, for the time, the Oxford Canal. This work was commenced in 1769, beginning from the Coventry canal at Longford, and extending to the Thames at Oxford. The whole capital authorised to be raised for this purpose was upwards of 300,000*l.*—the original estimate being 178,648*l.* The length is 80 miles, carried at the summit level at the height of 387½ feet above the level of the sea. It has three aqueducts the one at Brinklow nearly 300 feet long, and two tunnels the longest at Feeny Compton, being 3564 feet. The level, at its commencement at the Coventry Canal, is not less than 74 feet above the surface water of that channel, and rises from thence to the summit level about 75 feet. On the whole, this is one of the most important canals in the kingdom, as forming the connecting link between the inland navigation of the northern and southern districts.

#### Ohio and Pennsylvania Railroad.

The ceremony of breaking ground, on this great work took place on the fourth instant, at the point of crossing, on the State line.

The number of citizens of both states present was very large, and the ceremonies took place in a beautiful grove. The meeting was organized by the appointment of Hon. George Darsie, of Pennsylvania, as President; Hon. D. K. Carter, of Ohio, and Hon. R. R. Reed, of Pennsylvania, and Alfred Wright, Esq., of Ohio, Secretaries.

Addresses were delivered by Hon. George Darsie, Hon. D. K. Carter, and Solomon W. Roberts, Esq., Chief Engineer, of the Railroad Company, and the meeting resolved to aid in pressing forward the road to final completion.

The president of the company, Colonel William, Robinson, Jr., of Pittsburg, and the chief engineer then proceeded to break ground, in the presence of

the board of directors, at the exact point of crossing the line between the States of Ohio and Pennsylvania, which had been previously ascertained by an accurate survey.

We have received the speech of Mr. Roberts, the chief engineer of this road. We regret that our limits will allow us to give only brief extracts from it. It breathes a spirit in harmony with the greatness of the work; and if we may receive it as representing the feelings and intelligence of those interested in the road, it gives full assurance of success.

In speaking of the route and the means already provided, he says:

"Our line commences at the twin cities of Pittsburgh and Allegheny, the metropolis of Western Pennsylvania, to which, the magnitude and diversity of their iron manufactures have given the name of the Birmingham of America. They now have an aggregate population of about 70,000, which is rapidly increasing, and, I think, that for untiring industry, they are not surpassed by any other people. As yet they have no railroad, but they have adopted ours as the *Great Western railroad of Pittsburg*—and it will be the direct road to their best customers, running through the heart of the tier of States west of Pennsylvania, and connecting Pittsburg with Cleveland, Chicago, St. Louis and Cincinnati.

The city of Pittsburg has subscribed \$200,000 to the stock in its corporate capacity;—Allegheny city has subscribed an equal amount; and individual Pittsburgers about 225,000; making \$625,000 already subscribed in and about Pittsburg, which is applicable to the 48 miles of road in Pennsylvania. The amount subscribed up to this time in Ohio is about \$400,000.

From Pittsburg, our line is traced along and near the northern bank of the Ohio river to the mouth of Big Beaver, a distance of 25 miles. Thence passing thro' the boroughs of Rochester and New Brighton, and in the immediate vicinity of several other towns, containing an aggregate population of about 10,000, and admirably suited for manufacturing purposes, the railroad crosses the Big Beaver three miles and a half from its mouth, and begins to ascend to the summit with a maximum grade in no case exceeding 47 1/2 feet to the mile. The summit, at Clarke's, is about 12 miles from the mouth of the Beaver and the railroad at the summit cut will be 350 feet above high water mark in the Ohio river at that point. Our summit is much lower and more easily reached than others to the south of it.

Descending westward from the summit, with a somewhat lighter grade than that on its eastern side, we reach the valley of the Little Beaver; and thence to the State line near Palestine, we have light work, on a route which will afford convenient connection with Newcastle, and other towns to the north of us. Our curvature is moderate, and in no case with a less radius than 1000 feet. Of course we shall be able to run locomotives at high velocities, which is an essential characteristic of modern railroads.

By an elaborate series of surveys we have ascertained that the valley of the Big Beaver affords the best point of divergence for a rail-

road to leave the Ohio river, to reach the table lands of Ohio in the direction of Massillon and the west, and also for the shortest connection with Cleveland. The summit is lower, the distance shorter, and the country more favorable than on the more southerly routes. We avoid bridging the Ohio river, and by the intersection with the Cleveland railroad near Mount Union, the distance from Pittsburg to Cleveland will be about 134 miles; bringing those cities within six hours of each other.

The 23 miles of road, for which the contracts are about to be allotted, have been very carefully located; and the line has been traced upon the ground with great skill by Mr. Edward Warner, the resident engineer of the eastern division. Time has been taken to do the business thoroughly well, and so as to make sure of getting the best ground.

No money is so well expended by a railroad company, as that which is spent in obtaining the best possible final location; and no policy is so bad as that which, exemplifying the old adage, that "the most haste is the worst speed," takes its cue from the popular impatience, determines important questions without due examination, and finds, perhaps, after hundreds of thousands of dollars have been expended, that the whole of the money has been laid out in the wrong place.

We have carefully avoided this rock on which so many public works in this country have split, and yet we have made good progress. On the 11th of April, 1848, our charter was obtained in Pennsylvania—on the 11th of July our surveys were begun, and now, in less than a year from that time, we begin the construction of a railroad with a million of dollars subscribed to the stock of the company.

It is the intention of the directors to push the work westward to Mansfield, as fast as the means can be provided, and, for the means to grade and bridge the road, we look to the people of the towns and the country through which it will pass, and who will be most benefited by its completion.

The Company intends to pay for the work as it progresses; and this can only be done by promptness on the part of the Stockholders, in paying up their instalments, which is absolutely essential to the success of the enterprise. Their money will be expended in the country for labour, materials and supplies; and will be restored again to circulate in the community by which it was raised.—The work will be left at low prices and must be paid for in cash, that the labourer, who is worthy of his hire, may not be disappointed.

The route is by Beaver, Salem, Canton, Massillon, and Wooster, to Mansfield; and, on reaching Mansfield by our "back bone line" of 165 miles, we shall be enabled to connect with three lines running towards Lake Erie, and three towards Cincinnati, pouring in their tributes to our grand trunk.

At or near Mansfield we shall connect with the roads now in progress of construction to Chicago, on Lake Michigan, and St. Louis on the Mississippi; which are the proposed starting points of the vast lines projected

across the continent to the Pacific ocean.

When our road is fully completed to Mansfield, and has become fully consolidated, we expect to be able to run our first class trains through between Mansfield and Pittsburgh in but little over six hours. It is the intention of the Columbus and Pittsburgh railroad company to construct their road from Columbus by Mount Vernon in Knox county, which is the geographical centre of Ohio, and to unite it with our road west of Wooster. This will give us the best connection with Cincinnati, running through the richest part of Ohio, and with a string of towns along the whole line, the distance between Pittsburgh and Cincinnati being about 330 miles; which, with heavy iron rails and good locomotives, can readily be run in fifteen hours including all necessary stoppages.

We must run at high velocities to compete with the northern "lake short line," which is our real rival. We have the advantage of a shorter distance, a better country, a larger local population, and an abundance of bituminous and cannel coal.

Twenty two years have elapsed since the first railway in Pennsylvania was constructed upon which I came down with the first train of cars.—Connected ever since with the internal improvement of my native state, it is with pride and pleasure that I take part in the commencement of a work, which will make her the great thoroughfare of the Union, and build up the future fortunes of her Eastern as well as of her Western metropolis.

But let us ever remember that it is the men that constitute the State; and that in the moral influences of internal improvements we may see their most valuable characteristics. Show me a country the internal communications of which are neglected, and you show me a country barbarous or approaching to barbarism. Show me one on the contrary, whose highways are in a state of high improvement, and there I shall see a corresponding development of commercial facilities and commercial power, and a similar extension of the means of social happiness.

Men's ignorance of each other makes them jealous of each other, as isolation produces selfishness. But as we facilitate their means of intercourse, we draw them together by ten thousand ties of intercourse and affection. Thus, as time and expense are the measure of distance, our railroads are a most powerful means of drawing together our whole population in bonds of brotherhood.

Let us then do what we can both by example and precept to aid in the construction, and prompt completion of these great national highways.

This, which is the birth day of our favourite railroad, which is to unite the eastern land of past history, with the western land of future hope, is also the birth day of our beloved country. That country whose star spangled banner, now waving before us, is the best emblem of the high and heavenly aims with which it was founded. That country which from being the last among the nations of the earth, has become in the life time of some who now hear me, the pattern of them all."

At Palestine, on Wednesday evening, the board of directors made the following allotment of the contracts:

|                 |                     |
|-----------------|---------------------|
| Section No. 25— | P. Crowley & Son.   |
| " 26—           | Samuel Adams & Co.  |
| " 27—           | Flood & Loneragan.  |
| " 28—           | Thomas Scott.       |
| " 29—           | C. Cherry.          |
| " 30—           | Rhoads & Shugart.   |
| " 31—           | Blake & O'Sullivan. |
| " 32—           | James S. Stuart.    |
| " 33—           | J. & P. Penton.     |
| " 34—           | Groves & Co.        |
| " 35—           | Funkhouser & Co.    |
| " 36—           | Martin & Brothers.  |
| " 37—           | McKown & McIlwain.  |
| " 38—           | Henry Drum & Co.    |
| " 39—           | Young & Patton.     |
| " 40—           | Kelly & Sawkey.     |
| " 41—           | " "                 |
| " 42—           | W. W. Bell & Co.    |
| " 43—           | A. McDowell & Co.   |
| " 44—           | " "                 |

The whole number of proposals received was about 1000, and the work has been let at prices somewhat below the estimate of the engineer.

Section No. 25 is at Beaver Point, or Rochester; No. 28 is at New Brighton, and includes the masonry of the bridge across the Beaver; section No. 36 is at Clark's summit, and No. 44 is at the State line near Palestine.

In view of the construction of this road, the state of Pennsylvania is pushing forward her Central road with great energy to connect with the above road at Pittsburgh. The two roads united will form a remarkably direct route between the Atlantic and the west, and cannot fail to give a great increase of business to Philadelphia.

#### Eastern Railroad.

The annual meeting of this company took place in Boston on Monday last. We are indebted to the Boston Courier for an account of the proceedings, a part of which we present to our readers:

The report of the Directors after referring to the business generally as connected with the financial affairs of the road, states that the new branches taken together have not yielded an income equal to the dividend declared upon their capital, and that some loss has been incurred in operating the Essex Railroad. The company has every year since it has been in full operation, laid aside some of their profits to meet contingencies and depreciation. The amount has fluctuated with different years, one year rising as high as \$36,919, and the last year being only \$19,710. Still the whole amount is now \$28,771. Besides this, a renewal fund was commenced in 1845, which has reached the amount of \$70,799, but has all been expended upon the road.

The Directors very prudently state that this large sum, which has been carried to the sinking and contingent funds—

"Is not to be considered as an addition to the value of the stock, although it is the actual surplus earnings of the road. It only stands as an equivalent to deterioration already incurred, or for contingencies to which the company is liable. To this amount may properly be added the net earnings of the teaming establishment, which amount since it was put in operation in 1844, to \$12,105 16."

The Directors take the ground, that the only just and true mode with regard to individuals, is to divide the real earnings, after making proper reservations for depreciation, &c., as to do otherwise, would be to deprive the present stockholder of his property, for the benefit of the future holder. They state that, acting on these principles, they in 1844 established the two funds, surplus and contingency to which additions have been made every year, including all the profits of their real estate and other property. The net surplus of the last financial year is \$7313 47, which, added to sinking fund, \$98,134 34, and contingent fund, \$25,123 55, deducting \$2790 60, charged to renewal account, leaves the \$128,771 70, before mentioned, as the actual funded surplus of the company.

The capital account shows the whole cost of road and property—including main road, Marblehead, Gloucester and Salisbury branches, equipment, E. Boston improvements, ferry and lands, stock in Portsmouth bridge, Grand Junction Railroad, Penobscot Steam Navigation Company, Essex railroad &c.—total account are—Stock, \$2,150,000: State of Massachusetts, \$500,000; notes payable, \$227,745; dividend, \$106,324.

The receipts from 1,046,410 passengers have been \$388,800; from 47,552 tons of merchandise, \$61,018; mails, \$8,324; rents, \$22,271, &c. Total, \$490,066. The expenditures, including \$36,348 for interest on state script and loans, were \$218,343—making net income \$271,662.

The number of miles run was 265,440. Number of men employed, 214.

The rails, for nearly the whole distance between Boston and Salem, originally defective in form, and too light, have been replaced by new. 200 tons of iron have been purchased for the renewal of the residue, at £5 16s. in Wales, free on board. It is estimated that the cost of this renewal will be, less the value of the old iron, \$2000 per mile. About 2000 tons more will be required to complete the whole line of 40 miles.

The contract for running the Essex Railroad has ceased. The amount advanced to the Essex Railroad has been covered by their bonds, to the amount of \$65,861 38, and their notes for \$42,066 01, and there remains \$2922 44 balance on account. The whole is secured by a mortgage on the road, from the Junction to North-Danvers.

#### To Contractors.

SEALED PROPOSALS will be received at the office of the James River and Kanawha Company in Richmond, until the 20th day of August next, for the construction of the connection of the Company's Canal with the tide water of James River at Richmond, from the Basin along the line of the old locks, and through the Richmond dock. This work will consist of five locks of 13 8-10 feet lift, with short intermediate basins, such culverts, walls, wastes, street bridges, &c. as shall be necessary; the raising of the walls and embankment of the present Dock; the extension of the Dock a few hundred feet eastwardly; and the construction of an outlet lock at the lower end thereof, capable of admitting the largest vessels coming to the port of Richmond.

Sealed proposals will also be received at the same time and place, until the same date, for the construction of the following works:

1. For the construction of the connection of the Company's canal with the Rivanna river at Columbia. This work will consist of a canal four and a half miles long, a timber dam across the Rivanna river at Stillman's Mills, a stone guard-lock, and several culverts.

2. For the construction of the connection of the Company's canal with the James River at Cartersville.—This work will consist of a timber dam across James river, the excavation of a basin at Pemberton, and a canal from Pemberton to James river 1000 feet long, with a lock of 15 feet lift.

3. For the construction of the connection of the Company's canal with the James river Near new Canton.—This work will consist of a timber dam across James river, the excavation of a canal 1200 feet long, and a lock of 6 feet lift.

4. A wooden bridge across James river at Hardwicks-ville 724 feet long, supported by stone piers about 140 feet apart.

5. A wooden bridge across James river at Bent Creek 870 feet long, supported by stone piers about 140 feet apart.

This work will be paid for in current bank notes. Besides the usual reservation of 20 per cent. on the monthly estimates, the contractor or contractors will be required to give ample security, satisfactory to the board of Directors, for the completion of the work at the time and in the manner specified in the contracts.

Plans of the above work will be exhibited, and specifications thereof delivered to the contractors, at the Company's office in Richmond, by the 5th day of August next, on application to Mr. E. H. Gall, the Engineer in charge of the other works above enumerated. After the receipt of the proposals, time will be taken for the consideration thereof until the 23rd of the same month, on which day, in case the proposals should be found satisfactory, the several jobs, as above advertised, will be let.

WALTER GWYNN.  
Chief Engineer J. R. & K. Co.  
Richmond, July 18, 1849. 329



## Journal of the Franklin Institute of the State of Pennsylvania, for the Promotion of the Mechanical Arts.

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Engineer's Office, Southern Railroad, Jackson, Miss.

**Berrien, John M.,**  
Michigan Central Railroad, Marshall, Mich.

**Clement, Wm. H.,**  
Little Miami Railroad, Cincinnati, Ohio.

**Fisk, Charles B.,**  
Cumberland and Ohio Canal, Washington, D. C.

**Felton, S. M.,**  
Fitchburg Railroad, Boston, Mass.

**Floyd-Jones, Charles,**  
New York and Harlem Railroad Extension,  
Croton Falls, N. Y.

**Ford, James K.,**  
New York.

**Gzowski, Mr.,**  
St. Lawrence & Atlantic Railroad, Montreal, Canada.

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Rutland and Burlington Railroad, Rutland, Vt.

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**Holcomb, F. P.,**  
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**Trimble, Isaac R.,**  
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United States Fort, Bucksport, Me.

**Thomson, J. Edgar.,**  
Pennsylvania (Central) Railroad, Philadelphia.

**Whipple, S.,**  
Civil Engineer and Bridge Builder, Utica, N. Y.

**Williams, E. P.,**  
Auburn and Schenectady Railroad, Auburn, N. Y.

**Williams, Charles H.,**  
Milwaukee, Wisconsin.

## BUSINESS CARDS.

### To Railroad & Navigation Cos.

Mr. M. BUTT HEWSON, *Civil Engineer*, offers his services to Companies about to carry out the surveys or works of a line of Navigation or Railroad. He can give satisfactory references in New York City as to his professional qualifications; and will therefore merely refer here to the fact of his having been engaged for upwards of two years conducting important Public Works for the British Government.

Communications will find Mr. Hewson at the office of the Railroad Journal, 54 Wall Street, New York.

### J. T. Hodge,

NO. 1 NEW STREET, NEW YORK.

**James Laurie, Civil Engineer,**  
No. 23 RAILROAD EXCHANGE, BOSTON, MASS.  
Railroad Routes explored and surveyed. Estimates, Plans and Specifications furnished for Dams, Bridges, Wharves, and all Engineering Structures.  
October 14, 1848. 6m\*

**James Herron, Civil Engineer,**  
OF THE UNITED STATES NAVY YARD,  
PENSACOLA, FLORIDA.,

PATENTEE OF THE  
**HERRON RAILWAY TRACK.**

Models of this Track, on the most improved plans, may be seen at the Engineer's office of the New York and Erie Railroad.

**Dudley B. Fuller & Co.,**  
IRON COMMISSION MERCHANTS,  
No. 139 GREENWICH STREET,  
NEW YORK.

### Cruse & Burke,

*Civil Engineers, Architects and Surveyors,*  
Office, New-York State Institution of Civil Engineers,  
STATE HALL, ALBANY, N. Y.

Drawings, specifications and surveys accurately executed. Pupils instructed theoretically and practically at a moderate premium.  
May 26, 1849.

**To Railroad Companies.**  
—WROUGHT IRON WHEELS—  
SAFETY AND ECONOMY.  
**NORRIS' LOCOMOTIVE WORKS,**  
SCHENECTADY, NEW YORK,

Are Manufacturing Wrought Iron Driving, Truck, Tender, and Car Wheels—made from the best American Iron. Address  
E. S. NORRIS.  
May 16, 1849.

### Manning & Lee,

GENERAL COMMISSION MERCHANTS,  
NO. 51 EXCHANGE PLACE,  
BALTIMORE.

Agents for Avalon Railroad Iron and Nail Works. Maryland Mining Company's Cumberland Coal 'CED'—'Potomac' and other good brands of Pig Iron.

## IRON.

THE NEW JERSEY IRON CO'S WORKS AT Boonton, are now in full operation, and can execute orders for Railroad Bars of any required pattern, equal in quality to any made in this country. Apply to  
J. F. MACKIE,  
Nos. 85 and 87 Broad St.

New York, June 8, 1849.

### Railroad Iron.

OF approved T patterns, weighing 56 to 60 lbs. per lineal yard, made by the best English manufacturers, and under our own specification and inspection. In store and to arrive. For sale by

DAVIS, BROOKS, & CO.,  
68 Broad street.

New York, June 1, 1849.

The above will favorably compare with any other rails.

### Railroad Iron, Pig Iron, &c.

600 Tons of T Rail 60 lbs. per yard.

25 Tons of 24 by 4 Flat Bars.

25 Tons of 24 by 9-16 Flat Bars.

100 Tons No. 1 Gristherrie.

100 Tons Welsh Forge Pigs.

For Sale by A. & G. RALSTON & CO.  
No. 4 So. Front St., Philadelphia.

**Monument Foundry.**

**A. & W. DENMEAD & SON,**  
Corner of North and Monument Sts.,—Baltimore,  
HAVING THEIR

**IRON FOUNDRY AND MACHINE SHOP**

In complete operation, are prepared to execute faithfully and promptly, orders for Locomotive or Stationary Steam Engines, Woolen, Cotton, Flour, Rice, Sugar Grist, or Saw Mills, Slide, Hand or Chuck Lathes, Machinery for cutting all kinds of Gearing, Hydraulic, Tobacco and other Presses, Car and Locomotive patent Ring Wheels, warranted, Bridge and Mill Castings of every description, Gas and Water Pipes of all sizes, warranted, Railroad Wheels with best faggotted axle, furnished and fitted up for use, complete

Being provided with Heavy Lathes for Boring and Turning Screws, Cylinders, etc., we can furnish them of any pitch, length or pattern.

Old Machinery Renewed or Separated—and Estimates for Work in any part of the United States furnished at short notice.

June 8, 1849.

**Railroad Iron.**

**THE TRENTON IRON COMPANY ARE NOW** turning out one thousand tons of rails per month, at their works at Trenton, N. J. They are prepared to enter into contract to furnish rails of any pattern, and of the very best quality, made exclusively from the famous Andover iron. The position of the works on the Delaware river, the Delaware and Raritan canal, and the Camden and Amboy railroad, enables them to ship rails at all seasons of the year. Apply to

**COOPER & HEWITT, Agents.**  
17 Burling Slip, New York.

October 30, 1848.

**American Cast Steel.**

**THE ADIRONDAC STEEL MANUFACTURING CO.** is now producing, from American iron, at their works at Jersey City, N. J., Cast Steel of extraordinary quality, and is prepared to supply orders for the same at prices below that of the imported article of like quality. Consumers will find it to their interest to give this a trial. Orders for all sizes of hammered cast steel, directed as above, will meet with prompt attention.

May 28, 1849.

**SPRING STEEL FOR LOCOMOTIVES, TENDERS AND CARS.**—The subscriber is engaged in manufacturing spring steel from 1½ to 6 inches in width, and of any thickness required: large quantities are yearly furnished for railroad purposes, and wherever used its quality has been approved of. The establishment being large, can execute orders with great promptitude, at reasonable prices, and the quality warranted. Address **J. F. WINSLOW, Agent,** Albany Iron and Nail Works.

**Pig and Bloom Iron.**

**THE** Subscribers are Agents for the sale of numerous brands of Charcoal and Anthracite Pig Iron, suitable for Machinery, Railroad Wheels, Chains, Hollowware, etc. Also several brands of the best Puddling Iron, Juniata Blooms suitable for Wire, Boiler Plate, Axe Iron, Shovels, etc. The attention of those engaged in the manufacture of Iron is solicited by **A. WRIGHT & NEPHEW,** Vine Street Wharf, Philadelphia.

**Railroad Iron.**

**RAILROAD IRON & LOCOMOTIVE TIRES** imported to order, and constantly on hand, by **A. & G. RALSTON,** 4 South Front St., Philadelphia.

**Railroad Iron.**

**THE MOUNT SAVAGE IRON WORKS, AL-** leghany county, Maryland, having recently passed into the hands of new proprietors, are now prepared, with increased facilities, to execute orders for any of the various patterns of Railroad Iron. Communications addressed to either of the subscribers will have prompt attention. **J. F. WINSLOW, President** Troy, N. Y.

**ERASTUS CORNING, Albany.**  
**WARREN DELANO, Jr., N. Y.**  
**JOHN M. FORBES, Boston.**  
**ENOCH PRATT, Baltimore, Md.**

November 6, 1848.

**WILLIAM JESSOP & SONS' CELEBRATED CAST-STEEL.**

The subscribers have on hand, and are constantly receiving from their manufactory,

**PARK WORKS, SHEFFIELD,**

Double Refined Cast Steel—square, flat and octagon. Best warranted Cast Steel—square, flat and octagon. Best double and single Shear Steel—warranted.

Machinery Steel—round. Best and 2d gy. Sheet Steel—for saws and other purposes.

German Steel—flat and square, "W. I. & S." "Eagle" and "Goat" stamps.

Genuine "Sykes," L Blister Steel.

Best English Blister Steel, etc., etc., etc.

All of which are offered for sale on the most favorable terms by **WM. JESSOP & SONS,** 91 John street, New York.

Also by their Agents—

**Curtis & Hand,** 47 Commerce street, Philadelphia.

**Alex'r Fullerton & Co.,** 119 Milk street, Boston.

**Stickney & Beatty,** South Charles street, Baltimore.

May 6, 1848.

**Railroad Iron.**

**100 Tons 2½ x ½, 30 Tons Railroad.**

All fit to re-lay. For sale cheap by **PETTEE & MANN,** 228 South St., New York.

May 16, 1849.

**MANUFACTURE OF PATENT WIRE ROPE**

and Cables for Inclined Planes, Standing Ship Rigging, Mines, Cranes, Tillers, etc., by **JOHN A. ROEBLING, Civil Engineer,** Pittsburgh, Pa.

These Ropes are now in successful operation on the planes of the Portage railroad in Pennsylvania, on the Public Slips, on Ferries, and in Mines. The first rope put upon Plane No. 3, Portage railroad, has now run four seasons, and is still in good condition.

**Iron.**

**THE** Works of the New Jersey Iron Company at Boonton, N. J., having been recently enlarged and put in good repair, the company are prepared to receive orders for Iron, which will be executed with dispatch; and they warrant their iron equal in quality and finish to any in this country.

½ Round and square, to 6 inches.

½ Flat " " " "

Ovals, half-ovals and half-round.

Hoop, band and scroll iron.

Nail plates, superior charcoal Horse shoe,

Iron, sheet and Boiler iron.

Tire iron for locomotives.

Railroad spikes.

Pig iron of superior quality for chilling.

do. for foundry purposes.

For sale by **JOHN F. MACKIE,** 85 & 87 Broad Street.

Sole agent for the New Jersey Iron Co.

June 9, 1849.

**Railroad Iron.**

**THE UNDERSIGNED ARE PREPARED TO** contract for the delivery of English Railroad Iron of favorite brands, during the Spring. They also receive orders for the importation of Pig, Bar, Sheet, etc. Iron. **THOMAS B. SANDS & CO.,** 22 South William street, New York.

February 3, 1849.

**Railroad Iron.**

**THE SUBSCRIBERS ARE PREPARED TO** take orders for Railroad Iron to be made at their Phoenix Iron Works, situated on the Schuylkill River, near this city, and at their Safe Harbor Iron Works, situated in Lancaster County, on the Susquehanna river; which two establishments are now turning out upwards of 1800 tons of finished rails per month.

Companies desirous of contracting will be promptly supplied with rails of any required pattern, and of the very best quality.

**REEVES, BUCK & CO.,** 45 North Water St., Philadelphia.

March 15, 1849.

**Railroad Iron.**

**THE** Undersigned offer for sale 3000 Tons Railroad Iron at a fixed price, to be made of any required ordinary section, and of approved stamp.

They are generally prepared to contract for the delivery of Railroad Iron, Pig, Bar and Sheet Iron—or to take orders for the same—all of favorite brands, and on the usual terms. **ILLIUS & MAKIN,** 41 Broad street.

March 29, 1849.

**American Pig, Bloom and Boiler Iron.**

**HENRY THOMPSON & SON,** No 57 South Gay St., Baltimore, Md.

Offer for sale, Hot Blast Charcoal Pig Iron made at the Catocin (Maryland), and Taylor (Virginia), Furnaces; Cold Blast Charcoal Pig Iron from the Cloverdale and Catawba, Va., Furnaces, suitable for Wheels or Machinery requiring extra strength; also Boiler and Flue Iron from the mills of Edge & Hilles in Delaware, and best quality Boiler Blooms made from Cold Blast Pig Iron at the Shenandoah Works, Va. The productions of the above establishments can always be had at the lowest market prices for approved paper.

American Pig Iron of other brands, and Rolled and Hammered Bar Iron furnished at lowest prices. Agents for Watson's Perth Amboy Fire Bricks, and Rich & Cos. New York Salamander Iron Chests. Baltimore, June 14, 1849. 6 mos

**Iron Wire.**

**REFINED IRON WIRE OF ALL KINDS,** Card, Reed, Cotton-flyer, Annealed, Broom, Buckle, and Spring Wire. Also all kinds of Round, Flat or Oval Wire, best adapted to various machine purposes, annealed and tempered, straightened and cut any length, manufactured and sold by **ICHABOD WASHBURN.**

Worcester, Mass., May 25, 1849.

**American and Foreign Iron.****FOR SALE,**

**300 Tons A 1, Iron Dale Foundry Iron.**  
100 " 1, " " "  
100 " 2, " " "  
100 " " Forge " "  
400 " Wilkesbarre " "  
100 " "Roaring Run" Foundry Iron.  
300 " Fort " "  
50 " Catocin " "  
250 " Chikiswalungo " "  
50 " "Columbia" "chilling" iron, a very superior article for car wheels.  
75 " "Columbia" refined boiler blooms.  
30 " 1 x ½ Slit iron.  
50 " Best Penna. boiler iron.  
50 " "Puddled" "  
50 " Bagnall & Sons refined bar iron.  
50 " Common bar iron.

Locomotive and other boiler iron furnished to order.

**GOODHUE & CO.,** 64 South street

New York.

**PATENT HAMMERED RAILROAD, SHIP & BOAT SPIKES.**—The Albany Iron Works have always on hand, of their own manufacture, a large assortment of Railroad, Ship and Boat Spikes from 2 to 12 inches in length, and of any form of head. From the excellence of the material always used in their manufacture, and their very general use for rail roads and other purposes in this country, the manufacturers have no hesitation in warranting them fully equal to the best spikes in market, both as to quality and appearance. All orders addressed to the subscribers at the works will be promptly executed.

**JOHN F. WINSLOW, Agent.**

Albany Iron and Nail Works, Troy, N. Y.  
The above Spikes may be had at factory prices, of Erastus Corning & Co Albany; Meritt & Co., New York; E. Pratt & Br. Ltd., Baltimore, Md.

**LAP—WELDED WROUGHT IRON TUBES**

FOR

**TUBULAR BOILERS,**

FROM 1 1-2 TO 8 INCHES DIAMETER.

These are the ONLY Tubes of the same quality and manufacture as those so extensively used in England, Scotland, France and Germany, for Locomotive, Marine and other Steam Engine Boilers

**THOMAS PROSSER,** Patentee.

28 Platt street, New York.

**Roman Cement,**

**OF** the best quality, now landing from ship Hendrick Hudson, from London, made by Billingsley, Mial & Co., and superior to anything of the kind manufactured in England. For sale by **G. T. SNOW,** 109 Water Street, New York.



**Large Wooden Pumps.**

**SEVERAL** Large Wooden Square Pumps, of various sizes from 6 to 24 inches, and lengths from 10 to 25 feet, strongly bolted and strapped together with wrought iron; and used to great advantage on the Boston Water works; also two screw pumps each 25 feet long and 2½ feet in diameter, are now for sale by the Boston Water Commissioners.

For further particulars inquire at No. 119 Washington Street, Boston, or of E. S. CHESBROUGH, West Newton,

June 8, 1849.

**P. S. DEVLAN & CO's Patent Lubricating Oil.**

**THE** Subscribers invite the attention of Railroads, Steamboats, Machinists, etc., to the above article of Oil; they are prepared to supply it in any quantity. Certificates of its superiority over all other oils, from several of the largest Works and Railroads, can be seen at our office.

KENNEDY & GELSTON,

5½ Pine street, New York,

Sole Agents for the New England States and State of New York. 1y14

**TO RAILROAD COMPANIES AND MANUFACTURERS** of Railroad Machinery. The subscribers have for sale American and English Bar Iron, of all sizes; English Blister, Cast, Shear and Spring Steel; Juniata Rods; Car Axles, made of double refined iron; Sheet and Boiler Iron, cut to pattern; Tires for Locomotive Engines, and other railroad carriage wheels, made from common and double refined B. O. Iron; the latter a very superior article. The Tires are made by Messrs. Baldwin and Whitney, Locomotive Engine Manufacturers of this city. Orders addressed to them, or to us, will be promptly executed.

When the exact diameter of the wheel is stated in the order, a fit to those wheels is guaranteed, saving to the purchaser the expense of turning them out inside.

THOMAS & EDMUND GEORGE,

a15 N. E. cor. 12th and Market sts., Philad., Pa.

**To Railroad Companies and Contractors.**

**FOR SALE.**—Two Locomotive Engines and Tenders, at present in use on the Beaver Meadow Railroad, being too light for their coal trains, but well calculated for either gravel or light passenger trains.

They weigh, in running order, about 8 tons each—having one pair of driving wheels 4 feet diameter, 4 truck wheels 30 inches diameter, with cylinders 10 in. diameter, and 18 inches stroke of piston. Tenders on 4 wheels. Address JAMES ROWLAND,

Prest. Beaver Meadow Railroad & Coal Co., Philadelphia.

or, L. CHAMBERLAIN, Sec'y,

at Beaver Meadow, Pa.

May 19, 1849.

**India-rubber for Railroad Cos.**

**RUBBER SPRINGS.**—*Bearing and Buffer—Fuller's Patent.*—Hose from 1 to 12 inches diameter. Suction Hose. *Steam Packing.*—from 1-16 to 2 in. thick. *Rubber and Gutta Percha Bands.* These articles are all warranted to give satisfaction, made under Tyler & Helm's patent, issued January, 1849. No lead used in the composition. Will stand much higher heat than that called "Goodyear's," and is in all respects better than any in use. Proprietors of railroads do not be overcharged by pretenders.

HORACE H. DAY,

Warehouse 23 Courtlandt street.

New York, May 21, 1849.

**NICOLL'S PATENT SAFETY SWITCH FOR** Railroad Turnouts. This invention for some time in successful operation on one of the principal railroads in the country, effectually prevents engines and their trains from running off the track at a switch, left wrong by accident or design. It acts independently of the main track rails; being laid down or removed without cutting or displacing them.

It is never touched by passing trains, except when in use, preventing their running off the track. It is simple in its construction and operation, requiring only two castings and two rails; the latter, even if much worn or used, not objectionable.

Working models of the Safety Switch may be seen at Messrs. Davenport, Bridges & Kirk's Cambridge Port, Mass., and at the office of the Railroad Journal, New York.

Plans, Specifications, and all information obtained, on application to the Subscriber, Inventor and Patentee.

G. A. NICOLLS,

Reading, Pa.

**Large Pumps.**

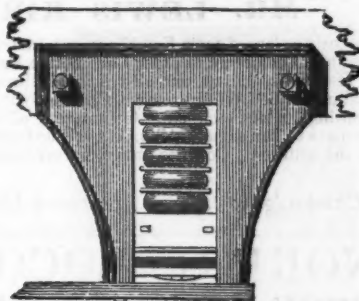
**THE** Boston Water Commissioners offer for sale a large number and variety of Wooden Square Pumps, used in clearing excavations from water during the construction of the Aqueducts.

Also Two Large Screw Pumps, each 25 feet long and 2½ feet in diameter.

For further particulars, enquire at the office of the Water Commissioners, 119 Washington St., Boston, or of E. S. Chesbrough, West Newton.

May 19, 1849.

6w20

**Patent India-rubber Springs.**

**FULLER & CO.** beg that parties interested in the use of these Springs will not be misled by exparte statements, but will examine the actual Patents and judge for themselves.

The statements made by Messrs. Crane & Ray shall be treated seriatim.

They claim to have first introduced India-rubber Springs about two years since, whereas they were used by Fuller & Co. nearly four years ago.

They claim the exclusive right to use Springs. They have no right whatever; every spring they make is an infringement upon Fuller's patent, dated 1845. They claim the sole right to make India rubber, and apparently think because a species of India-rubber was patented some years since, that no person can make any other now. A patent was granted in January last to Messrs. Tyler & Helm for a new and improved kind of Vulcanized rubber which is used by Fuller & Co.

Fuller's springs it is needless to say are in very general use, although Messrs. Crane & Ray pretend that they know of only one or two instances. Fuller & Co. guarantee all parties who use their springs.

As to the Legal proceedings—an action has been commenced against one company for an alleged infringement of Goodyear's patent, but is being defended with every prospect of success. An action has also been commenced by Fuller & Co., against parties for an infringement of Fuller's patent, and this will be done in every case of violation.

In every case in which Fuller's spring has been applied, it has been pronounced superior to that made by Mr. Ray, and this fact induces Messrs. Crane & Ray to claim the right of using it. They attempt to lead the public from the real question at issue, by producing a Deposition as to Mr. Ray having tried to make a spring which Mr. Fuller did make and patent. If Mr. Ray did invent a spring in 1844, why did he not apply for a patent, and not wait until 1848, when his application was rejected?

Mr. Kneivitt has never stated that the springs were put on by him, which are referred to in Mr. Hale's article, but he does state that those springs are made according to Mr. Fuller's specification, and consequently are an infringement upon it. The article of Mr. Hale in the Boston Advertiser, quoted by Messrs. Crane & Ray, was followed immediately by a letter in the same paper, from Mr. Kneivitt, setting forth the facts of the case.

The springs referred to were put on by Mr. Ray before Mr. Kneivitt came to the United States; when he arrived he gave Mr. Ray notice not to proceed further in making or vending such springs; Mr. Ray then said he did not wish to infringe, and would not continue to do so, and he then contrived an India-rubber and Air spring which totally failed.

In the selection of their first agent, Fuller & Co. were particularly unfortunate, and their reason for advertising to it is simply that it may tend to throw light on subsequent transactions, and furnish a reply to the remark, "that this opposition was invited by their own delay in getting the thing to work." The individual referred to undertook the agency for Fuller's springs, and left Liverpool on the 1st January, 1847, furnished with a complete set of drawings, models, etc., and every necessary instruction to make arrangements respecting the supply of material, and to have it at work within the time limited by law; but from that hour to the present, not a single communication has been received from the said agent. Some of their models,

however, they have traced into the hands of parties now seeking to invade their rights, and by whom they understand they have been exhibited as specimens of their own invention.

The superiority of Fuller's spring is implied in the offer of the New England Car Co. to make springs upon his principle (now that a preference is given to the disc and plate form) and this notwithstanding the fact, that Fuller & Co. have a patent, and that Mr. Ray's application for one was rejected. The public can judge which company's course has been the most honorable, or whose statements are entitled to consideration.

Fuller's springs can be obtained of Mr. Kneivitt the Agent, at 38 Broadway New York, and of Messrs. James Lee & Co., 18 India Wharf, Boston.

May 26, 1849.

**C. W. Bently & Co.,**

**PORTABLE** Steam Engine and Boiler Manufacturers, East Falls Avenue, near Pratt St. Bridge, BALTIMORE, MARYLAND.

Their Engines are simple in their construction, compact and durable; they require no brick work in setting them, and occupying but a small space (a six horse power engine and boiler, standing on a cast iron plate of three by six feet.)

They also manufacture Major W. P. Williamson's new oscillating Engine; a superior article, combining cheapness and simplicity (one of which may be seen in operation at their shop.) Both of these engines are adapted to any purpose; where power is required, and may be made of any capacity; and for economy in use of fuel are unsurpassed.

All kinds of machinery made to order. Steam Generators, Force Pumps, Wrought Iron Pipes and Fittings for Steam, Water, Gas, etc., constantly on hand, Baltimore, June 6, 1849.

**PHILADELPHIA CAR MANUFACTORY,**

CORNER SCHUYLKILL 2D AND HAMILTON STS.,

SPRING GARDEN, PHILADELPHIA CO., PA.

**Kimball & Gorton,**

Having recently constructed the above works, are prepared to construct at short notice all kinds of

**RAILROAD CARS, Viz:**

Passenger Cars of all classes—Open and Covered Freight and Express Cars—Coal Cars—Hand Cars & Trucks of all descriptions.

They are also prepared to furnish Chilled Wheels of any pattern. Car Wheels & Axles fitted and furnished. Snow Ploughs and Tenders made to order. Steel and other Springs always on hand.

All orders will be filled at short notice, and upon as good terms as at any other establishment in the country.

Omnibuses from the Exchange run within one square of the manufactory every 10 minutes during the day. Philadelphia, June 16, 1849. 1y25

**LAWRENCE'S ROSENDALE HYDRAULIC**

Cement. This Cement is warranted equal to any manufactured in this country, and has been pronounced superior to Francis' "Roman." Its value for Aqueducts, Locks, Bridges, Floors, and all Masonry exposed to dampness, is well known, as it sets immediately under water, and increases in solidity for years.

For sale in lots to suit purchasers, in tight papered barrels, by JOHN W. LAWRENCE,

142 Front-street, New York.

Orders for the above will be received and promptly attended to at this office. 32 ly.

**Text Book of Mechanical Drawing,**

**FOR** the use of SCHOOLS and SELF-INSTRUCTION, containing,

1st. A series of progressive practical problems in Geometry, with full explanations, couched in plain and simple terms; showing also the construction of the parallel ruler, plane scales and protractor.

2d. Examples for drawing plans, sections and elevations of Buildings and Machinery, the mode of drawing elevations from circular and polygonal plans, and the drawing of Roman and Grecian Mouldings.

3d. An introduction to Isometrical drawing, with 4 plates of examples.

4th. A treatise on Linear Perspective, with numerous examples and full explanations, rendering the study of the art easy and agreeable.

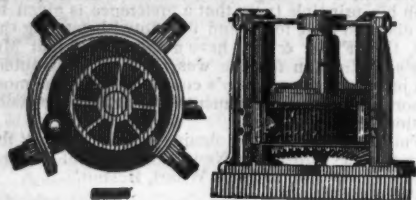
5th. Examples for the projection of shadows.

The whole illustrated with 50 STEEL PLATES.

Published by WM. MINFIE & CO.,

114 Baltimore St., Baltimore, Md.

Price \$3, to be had of all the principal booksellers.

**MACHINERY.****Henry Burden's Patent Revolving Shingling Machine.**

THE Subscriber having recently purchased the right of this machine for the United States, now offers to make transfers of the right to run said machine, or sell to those who may be desirous to purchase the right for one or more of the States.

This machine is now in successful operation in ten or twelve iron works in and about the vicinity of Pittsburgh, also at Phoenixville and Reading, Pa., Covington Iron Works, Md., Troy Rolling Mills, and Troy Iron and Nail Factory, Troy, N. Y., where it has given universal satisfaction.

Its advantages over the ordinary Forge Hammer are numerous: considerable saving in first cost; saving in power; the entire saving of shingler's, or hammerman's wages, as no attendance whatever is necessary, it being entirely self-acting; saving in time from the quantity of work done, as one machine is capable of working the iron from sixty puddling furnaces; saving of waste, as nothing but the scoria is thrown off, and that most effectually; saving of staffs, as none are used or required. The time required to furnish a bloom being only about six seconds, the scoria has no time to set, consequently is got rid of much easier than when allowed to congeal as under the hammer. The iron being discharged from the machine so hot, rolls better and is much easier on the rollers and machinery. The bars roll rounder, and are much better finished. The subscriber feels confident that persons who will examine for themselves the machinery in operation, will find it possesses more advantages than have been enumerated. For further particulars address the subscriber at Troy, N. Y.

P. A. BURDEN.

**Railroad Spikes and Wrought Iron Fastenings.**

THE TROY IRON AND NAIL FACTORY, exclusive owner of all Henry Burden's Patented Machinery for making Spikes, have facilities for manufacturing large quantities upon short notice, and of a quality unsurpassed.

Wrought Iron Chairs, Clamps, Keys and Bolts for Railroad fastenings, also made to order. A full assortment of Ship and Boat Spikes always on hand.

All orders addressed to the Agent at the Factory will receive immediate attention.

P. A. BURDEN, Agent,  
Troy Iron and Nail Factory, Troy, N. Y.

**RAILROAD WHEELS.**

**CHILLED RAILROAD WHEELS.**—THE UNDERSIGNED are now prepared to manufacture their Improved Corrugated Car Wheels, or Wheels with any form of spokes or discs, by a new process which prevents all strain on the metal, such as is produced in all other chilled wheels, by the manner of casting and cooling. By this new method of manufacture, the hubs of all kinds of wheels may be made whole—that is, without dividing them into sections—thus rendering the expense of banding unnecessary; and the wheels subjected to this process will be much stronger than those of the same size and weight, when made in the ordinary way.

A. WHITNEY & SON,  
Willow St., below 13th,  
Philadelphia, Pa.

**CHILLED RAILROAD WHEELS.**—THE UNDERSIGNED, the Original Inventor of the Plate Wheel with solid hub, is prepared to execute all orders for the same, promptly and faithfully, and solicits a share of the patronage for those kind of wheels which are now so much preferred, and which he originally produced after a large expenditure of time and money.

A. TIERS,  
Point Pleasant Foundry.

He also offers to furnish Rolling Mill Castings, and other Mill Gearing, with promptness, having, he believes, the largest stock of such patterns to be found in the country.

Kensington, Philadelphia Co.,  
March 12, 1849.

**ENGINE AND CAR WORKS.****DAVENPORT & BRIDGES,**

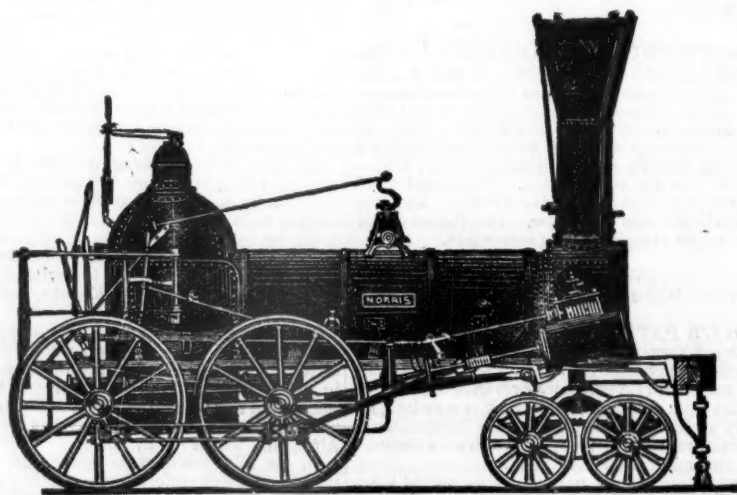
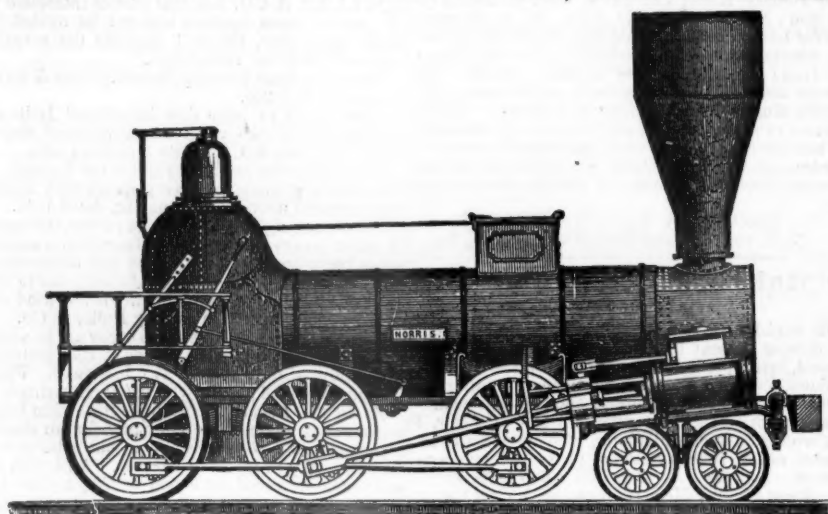
HAVING ASSOCIATED WITH THEM

MR. LEWIS KIRK, OF READING, PA.,

And recently enlarged their Establishment, (making it now the most extensive in the United States,) they are prepared to manufacture to order Locomotive Engines and Cars of every description. Stationary Engines, Steam Hammers, Boilers, and all kinds of Railroad Machinery. Also, Castings and Forge Irons of all kinds—including Chilled Wheels, Frogs, Chairs, Switches, Car Axles, and Locomotive Cranks, Connecting Rods, Steel Springs, Bolts, etc., etc. Orders from all parts of the country solicited for Engines and Cars, or any part or parts of the same. All orders will be furnished at short notice, and on as good terms as any manufactory in the country. Coaches pass our works every fifteen minutes during the day, from Brattle St., Boston.

DAVENPORT, BRIDGES & KIRK,

Cambridgeport, Mass., February 16th, 1849.

**NORRIS' LOCOMOTIVE WORKS.**  
**BUSHHILL, SCHUYLKILL SIXTH-ST., PHILADELPHIA,**

THE UNDERSIGNED Manufacture to order Locomotive Steam Engines of any plan or size. Their shops being enlarged, and their arrangements considerably extended to facilitate the speedy execution of work in this branch, they can offer to Railway Companies unusual advantages for prompt delivery of Machinery of superior workmanship and finish.

Connected with the Locomotive business, they are also prepared to furnish, at short notice, Chilled Wheels for Cars of superior quality.

Wrought Iron Tyres made of any required size—the exact diameter of the Wheel Centre, being given, the Tyres are made to fit on same without the necessity of turning out inside.

Iron and Brass castings, Axles, etc., fitted up complete with Trucks or otherwise.

NORRIS, BROTHERS.



### Mattewan Machine Works.

THE Mattewan Company have added to their Machine Works an extensive LOCOMOTIVE ENGINE department, and are prepared to execute orders for Locomotive Engines of every size and pattern—also Tenders, Wheels, Axles, and other railroad machinery, to which they ask the attention of those who wish such articles, before they purchase elsewhere.

**STATIONARY ENGINES, BOILERS, ETC.,**  
Of any required size or pattern, arranged for driving Cotton, Woollen, or other Mills, can be had on favorable terms, and at short notice.

**COTTON AND WOOLLEN MACHINERY,**  
Of every description, embodying all the modern improvements, second in quality to none in this or any other country, made to order.

**MILL GEARING,**  
Of every description, may be had at short notice, as this company has probably the most extensive assortment of patterns in this line, in any section of the country, and are constantly adding to them.

#### TOOLS.

Turning Lathes, Slabbing, Planing, Cutting and Drilling Machines, of the most approved patterns, together with all other tools required in machine shops, may be had at the Mattewan Company's Shops, Fish-kill Landing, or at 39 Pine street, New York.

WM. B. LEONARD, Agent.

**IRON BRIDGES, BRIDGE & ROOF BOLTS,**  
etc. STARKS & PRUYN, of Albany, New York, having at great expense established a manufactory with every facility of Machinery for Manufacturing Iron Bridges, Bridge and Roof Bolts, together with all kinds of the larger sizes of Screw Bolts, Iron Railings, Steam Boilers, and every description of Wrought Iron Work, are prepared to furnish to order, on the shortest notice, any of the above branches, of the very best of American Refined Iron, and at the lowest rates.

During the past year, S. & P. have furnished several Iron Bridges for the Erie Canal, Albany Basin, etc.—and a large amount of Railroad Bridge Bolts, all of which have given the most perfect satisfaction.

They are permitted to refer to the following gentlemen:

|                         |   |
|-------------------------|---|
| Charles Cook,           | Canal Commissioners<br>of the<br>State of New York. |
| Nelson J. Beach,        |   |
| Jacob Hinds,            |   |
| Willard Smith, Esq.,    | Engineer of the Bridges for<br>the Albany Basin.    |
| Messrs. Stone & Harris, | Railroad Bridge Builders,                           |
| Mr. Wm. Howe,           | Springfield, Mass.                                  |
| Mr. S. Whipple,         | Engineer & Bridge Builder,                          |
| January 1, 1849.        | Utica, N. Y.  |

**TO RAILROAD COMPANIES AND BUILDERS OF MARINE AND LOCOMOTIVE ENGINES AND BOILERS.**

#### FASCAL IRON WORKS.

##### WELDED WROUGHT IRON TUBES

From 4 inches to 48 in calibre and 2 to 12 feet long, capable of sustaining pressure from 400 to 2500 lbs. per square inch, with Stop Cocks, T, L, and other fixtures to suit, fitting together, with screw joints, suitable for STEAM, WATER, GAS, and for LOCOMOTIVE and other STEAM BOILER FLUES.



Manufactured and for sale by  
**MORRIS, TASKER & MORRIS.**  
Warehouse S. E. Corner of Third & Walnut Streets,  
**PHILADELPHIA.**

**THE NEWCASTLE MANUFACTURING Co.**  
continue to furnish at the Works, situated in the town of Newcastle, Del., Locomotive and other steam engines, Jack Screws, Wrought Iron Work and Brass and Iron Castings, of all kinds connected with Steamboats, Railroads, etc.; Mill Gearing of every description; Cast Wheels (chilled) of any pattern and size, with Axles fitted, also with wrought tires, Springs, Boxes and bolts for Cars; Driving and other wheels for Locomotives.

The works being on an extensive scale, all orders will be executed with promptness and despatch. Communications addressed to Mr. William H. Dobbs, Superintendent, will meet with immediate attention.

**ANDREW C. GRAY,**  
President of the Newcastle Manuf. Co.

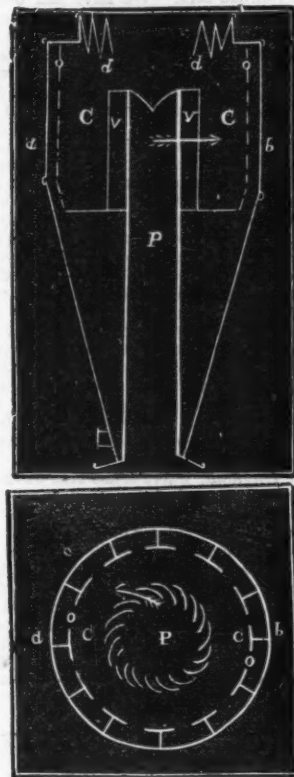
### PATENT MACHINE MADE HORSE-SHOES.

The Troy Iron and Nail Factory have always on hand a general assortment of Horse Shoes, made from Refined American Iron.

Four sizes being made, it will be well for those ordering to remember that the size of the shoe increases as the numbers—No. 1 being the smallest.

P. A. BURDEN, Agent,  
Troy Iron and Nail Factory, Troy, N. Y.

### FRENCH & BAIRD'S Patent Spark Arrester.



**TO THOSE INTERESTED IN RAILROADS.**  
Railroad Directors and Managers are respectfully invited to examine an improved Spark Arrester recently patented by the undersigned.

Our improved Spark Arresters have been extensively used during the last year on both Passenger and Freight Engines, and have been brought to such a state of perfection, that no annoyance from sparks or dust from the chimney of engines on which they are used is experienced.

These Arresters are constructed on an entirely different principle from any heretofore offered to the public. The form is such that a rotary motion is imparted to the heated air, smoke and sparks passing through the chimney, and by the centrifugal force thus acquired by the sparks and dust, they are separated from the smoke and steam, and thrown into an outer chamber of the chimney through openings near its top, from whence they fall by their own gravity to the bottom of this chamber; the smoke and steam passing off at the top of the chimney, through a capacious and unobstructed passage, thus arresting the sparks without impairing the power of the engine by diminishing the draught or activity of the fire in the furnace.

These chimneys and arresters are simple, durable and neat in appearance. They are now in use on the following roads, to the managers and other officers of which we are at liberty to refer those who may desire to purchase, or obtain further information in regard to their merits.

R. L. Stevens, president Camden and Amboy railroad company; Rich'd Peters, sup't Georgia railroad, Augusta, Ga.; G. A. Nicolls, sup't Reading railroad, Reading, Pa.; W. E. Morris, pres't Philadelphia, Germantown and Norristown railroad company, Philad.; E. B. Dudley, pres't W. and R. railroad co., Wilmington, N. C.; Col. Jas. Gadsden, pres't S. Carolina railroad co., Charleston, S. C.; W. C. Walker, agent V. and J. railroad, Vicksburg, Miss.; R. S. Van Rensselaer, sup't Hart and N. H. railroad; W. R. McKee, sup't Lexington and Ohio railroad; T. L. Smith, sup't

N. Jersey railroad and transp. co.; J. Elliott, sup't M. P., Philadel. and Wilm. railroad; J. O. Storn, sup't Elizabethtown and Somerville railroad; R. R. Cuyler, pres't Central railroad, Savannah, Ga.; J. D. Gray, sup't Macon, (Ga.) railroad; J. H. Cleveland, sup't of Southern railroad, Monroe, Mich.; M. F. Crittenden, sup't mo. power Central railroad, Detroit, Mich.; G. B. Fisk, pres't Long Island railroad, Brooklyn, L. I.

Orders for these chimneys and arresters, addressed to the subscribers, care of Baldwin and Whitney, of Philadelphia, will be promptly executed.

The subscribers will dispose of single rights, or rights for one or more States on reasonable terms.

FRENCH & BAIRD.

Philadelphia, Pa., April 6, 1844.

The letters in the figures refer to the article given in the Journal of June, 1844.

### Improvement for Lessening Friction on Railroads.

THE Improvement sometime since perfected for lessening the friction on rails, cars and engines, having been fairly tested, and found to possess all the advantages anticipated, is now presented to the notice of parties connected with railroad companies.

The article used is India-rubber, chemically combined with a metallic substance, in such a manner as to give it a remarkable degree of strength and durability, and the peculiar quality of not being affected by abrasion, or the extremes of either heat or cold.

The advantages derived from its application are briefly as follows:

1st, A sensible lessening of friction on the rails, and of wear and tear to the machinery of the locomotives and cars.

2d, A general benefit to the whole superstructure of the road, by the trains passing with an easier and less jarring action.

3d, A greater degree of comfort to the passengers, owing to the exemption from the usual loud and annoying rattling of the cars and engines.

4th, An increased speed to the trains, with the same power, arising from the uniform steadiness and decrease of friction to the rails, cars, etc.

And lastly, a material saving in the annual expenditure for repairs.

A drawing, illustrating the application of India-rubber to this purpose, will be found in the American Railroad Journal, under date of May 26, 1849.

The annexed certificate, among others in the hands of the patentee, will explain the nature of this improvement.

"J. ELNATHAN SMITH, Esq.,

Dear Sir: In relaying the New Orleans and Carrollton railroad, I applied Vulcanized India-rubber in the Chairs, under the joints of the rails, of 1-10 of an inch thick, with the happiest result. The road thus laid has been in constant daily use since August last, and I cannot perceive the least deterioration. The rubber acts admirably as a wedge, in the way I use it, as well as a perfect preventive of the battering down of the ends of the rails. It also makes the road unusually smooth—for in riding over it I have not been able to detect the joints; and I have had the assertion of several observers of such matters to the same effect. We are delighted with it here, and think it a very important simple, and cheap acquisition in the permanent maintenance of railroads.

The annexed sketch of the chair I use, will give an idea how the rubber acts as a wedge. They weigh 13 lbs. and are 7 inches square—are accurately cast to one size, and when in their places, ready for the rails, I place a piece of the rubber 1-10 of an inch thick thereon. The width of the base of the rail, and the length of the chair is 3 1/4 by 7 inches. The rail is then forced in sideways, which, owing to there being but 1-16 of an inch space for 1-10 inch thickness of rubber, requires considerable pressure; consequently, the elasticity keeps the rail tight up to the clip of the chair A. I have closely observed the joints when the engine passed over them, but could not detect any depression of the rails separate from each other.

I find that the cost for the rubber will be about 7 cts. per joint, which for 21 feet rails, will be about \$35 per mile, exclusive of the patent right.

The rubber I use is of excellent quality, and made in pieces of about 20 to 30 yards long, and 25 inches wide, (1-10 of inch thick,) and weighs about 4 lbs. to the yard in length. I cut 7 pieces in the width, consequently 7 inches in length makes 7 pieces or 7 yards, weighing about 28 lbs., will give 252 pieces, or half a mile of road with 21 feet rails. I am respectfully yours,

JOHN HAMPSON.

Eng. New Orleans and Carrollton Railroad.  
New Orleans, March 14, 1849.

Orders received and full information by  
**J. ELNATHAN SMITH, Patentee,**  
22 John street,  
New York, May 26, 1849.

## Fuller's Patent India-Rubber Springs.

**T**HERE can now be no ground of opposition whatever to these Springs. The Commissioner of Patents has not only rejected the application for a Patent for a similar Spring, but a Patent has just been granted for an entirely new species of India Rubber, the quality of which can be surpassed by no other kind, as the experiments which have lately been publicly made, have fully proved. No extremes of heat or cold can effect it, nor will any amount of pressure permanently alter its shape. This Patent refutes the statement of the "New England Car Company" as to their sole right to use India Rubber.

The Spring (composed by alternate layers of India Rubber Discs and Metal Plates) is superior to any other form of Spring, for several reasons: It is the lightest, the most simple and most durable—there being less friction in this than in other kind; it can be regulated to any extent desired. A less quantity of Rubber is required in this form to make a good spring than in any other because each disc or ring of India Rubber is firmly supported by metal plates, and forms in itself a distinct spring—nor is any spiral spring required. The Patentee is consequently able to supply efficient springs at a less cost than any other parties can do. Purchasers are guaranteed in the use of these springs.

The New England Car Company have no right to make an India-rubber Spring with a Bolt through the centre. All companies using such a spring are liable to an action.

Fuller's spring has been used nearly four years with complete success. It is applicable equally to Passenger and Freight Cars, to Locomotives and Tenders. Bumpers and Draw Springs are always kept on hand, which merely require screwing to a car. It has lately been applied also to several kinds of Machines.

Action will be brought against all persons infringing upon these patents.

The subscriber will show Models and Drawings of the various modes of application to Cars, Machines, Omnibuses, &c.

G. M. KNEVITT, Agent.

Principal office, No. 33 Broadway, New York.

Branch office, Messrs. James Lee & Co.'s, No. 18 India Wharf, Boston.

Mr. Hale, the President of the Boston and Worcester Railroad, wrote an article concerning Fuller's

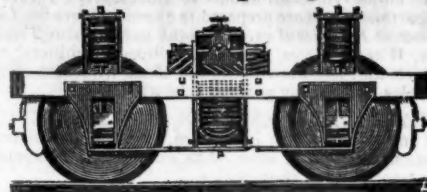
Spring. The "New England Car Company" take the liberty of publishing that article, omitting, however, a very important part; it is therefore given in full now, and the portion omitted by the New England Car Company is printed in italics, that the public may judge the manner in which this "company" pervert Mr. Hale's meaning.

[From the Boston Advertiser of the 7th June].

INDIA RUBBER SPRINGS FOR RAILROAD CARS.

"Of the numerous uses to which the wonderful elasticity and durability of India rubber, renders this material applicable, we are hardly aware of one, in which it has been more successful than in forming springs for railroad cars. We have had occasion to observe, for some months past, its application to this use, on one of the passenger cars on the Newton special train of the Boston and Worcester railroad. It is there used not only for the springs on which the car rests, but for the springs attached to the draw bar, at each end of the car, to prevent any jar on the sudden commencement, or interruption of the motion of the car. For both these purposes it seems to be admirably adapted, and we do not learn that during that period in which it has been used, any defect has been discovered. It renders the movements of the car extremely easy, and protects it more effectually, we think, than any other spring we have seen in use, from every harsh or unpleasant motion, either vertical or horizontal. It is also simple in its form and application, extremely light, and little liable to get out of repair. During the period of some months in which we have seen the springs in operation, there is no apparent wear or diminution of its efficiency. Each spring is composed of several circular layers of rings of India rubber, a thin metallic plate of the same size being interposed between each of the layers. From the simplicity of its form, it cannot be expensive, and it admits of being made more or less elastic almost at pleasure. The invention, we understand, was first patented in England, where it has been introduced into general use on several of the principal railroads, and we have no doubt it will come into very extensive use in this country. The patent for this invention, we understand, has been granted to Mr. W. C. Fuller, in England and France, and also in this country. Mr. Knevelt, of New York, is the agent for the patentee in the United States, and he has established a branch office for the supply of the article in this city, as may be learned from an advertisement in another column of this paper."

## F. M. Ray's Patent India-rubber Car Springs.



India-rubber Springs for Railroad Cars were first introduced into use, about two years since, by the inventor. The New England Car Company, now possesses the exclusive right to use, and apply them for this purpose in the United States. It is the only concern that has tested their value by actual experiment, and in all arguments in favor of them, drawn from experience of their use, are in those cases where they have been furnished by this company. It has furnished every spring in use upon the Boston and Worcester road, and, in fact, it has furnished all the springs ever used in this country, with one or two exceptions, where they have been furnished in violation of the rights of this company; and those using them have been legally proceeded against for their use, as will invariably be done in every case of such violation.

The Spring formed by alternate layers of India-rubber discs and metal plates, which Mr. Fuller claims to be his invention, was invented by Mr. Ray in 1844. In proof of which we give the deposition of Osgood Bradley, of the firm of Bradley & Rice, of Worcester, Mass., car manufacturers, and men of the highest respectability. In this deposition, in relation to the right of parties to use these springs, he says:

"I have known Mr. Ray since 1835. In the last of May or the commencement of June, 1844, he was at my establishment, making draft of car trucks. He staid there until about the first of July, and left and went to New York. Was gone some 8 or 10 days, and returned to Worcester. He then on his return said he had a spring that would put iron and steel springs into the shade. Said he would show it to me in a day or two. He showed it to me some two or three days afterwards. It was a block of wood with a hole in it. In the hole he had three pieces of India-rubber, with iron washers between them, such as are used under the nuts of cars. Those were put on to a spindle running through them, which worked in the hole. The model now exhibited is similar to the one shown him by Ray. After the model had been put into a vice, witness said that he might as well make a spring of putty. Ray then said that he meant to use a different kind of rubber, and referred to the use of Goodyear's Metallic Rubber, and that a good spring would grow out of it." There are many other depositions to the same effect.

The history of the invention of these springs, together with these depositions, proving the priority of the invention of Mr. Ray, will be furnished to all interested at their office in New York.

This company is not confined to any particular form in the manufacture of their springs. They have applied them in various ways, and they warrant all they sell.

The above cut represents precisely the manner in which the springs were applied to the cars on the Boston and Worcester road, of which Mr. Hale, President of this road speaks, and to which Mr. Knevelt refers in his advertisement. Mr. Hale immediately corrected his mistake in the article quoted by Mr. Knevelt, as will be seen by the following from his paper of June 8, 1848. He says:

INDIA-RUBBER SPRINGS FOR RAILROAD CARS.—"In our paper yesterday, we called attention to what promises to be a very useful invention, consisting of the application of a manufacture of India-rubber to the construction of springs for railroad cars. Our object was to aid in making known to the public, what appeared to us the valuable properties of the invention, as they had been exhibited on trial, on one of the passenger cars of the Boston and Worcester railroad. As to the origin of the invention we had no particular knowledge, but we had been informed that it was the same which had been introduced in England, and which had been subsequently patented in this country; and, we were led to suppose that the manufacturers who have so successfully applied this material, in the case to which we referred had become possessed of the right to use that patent. It will be seen from the following communication, addressed to us by a member of the company, by which the Worcester railroad was supplied with the article upon which our remarks were based, that we were in an error, and that the springs here introduced are an American invention, as well as an American manufacture. How far the English invention may differ from it we have had no opportunity of judging."



## RIDER'S PATENT IRON BRIDGE.

THE RIDER IRON BRIDGE having been fully tested on the Harlem Railroad, by constant use for about eighteen months, and found to answer the full expectations of its most sanguine friends, is now offered to the public with the utmost confidence as to its great utility over any other Bridge now known.

The plan of this Bridge is to use the iron so as to obtain its greatest longitudinal strength, and at the same time is so arranged as to secure the combined principles of the Arch, Suspension and Triangle, all under such controlling power as causes each to act in the most perfect and secure manner, and at the same time impart its greatest strength to the whole work.

THE IRON RIDER BRIDGE COMPANY are prepared to furnish large quantities of Iron Bridging for Railroad or other purposes, made under the above patent, at short notice, and at prices far more economical than the best wood structure, and on certain conditions, the first cost may be made the same as wood.

Models, and pamphlets giving full descriptions of the RIDER BRIDGE, with certificates based on actual trial from undoubted sources, will be found at the office of the Company, 74 BROADWAY, up stairs, or of W. RIDER & BROTHERS, 58 Liberty Street, where terms of contract will be made known, and where orders are solicited.

November 25, 1848.

M. M. WHITE,  
Agent for the Company.

## RAILROAD India-rubber Springs.

**I**F any Railroad Company or other party desires it, the NEW ENGLAND CAR COMPANY will furnish India-rubber Car Springs made in the form of washers, with metallic plates interposed between the layers, or in any other form in which they can be made; in all cases guaranteeing the right to use the same against any and all other pretended rights or claims whatsoever.

F. M. Ray, 98 Broadway, New York.  
E. CRANE, 99 State Street, Boston.  
May 24, 1849.

**L**AP-WELDED WROUGHT IRON TUBES for Tubular Boilers, from 14 to 15 inches diameter, and any length not exceeding 17 feet—manufactured by the Caledonian Tube Company, Glasgow, and for sale by

IRVING VAN WART,  
12 Platt street, New York.

JOB CUTLER, Patentee.

These Tubes are extensively used by the British Government, and by the principal Engineers and Steam Marine and Railway Companies in the Kingdom.



# AMERICAN RAILROAD JOURNAL.

**MR. HALE:**—"The New England Car Co., having been engaged for the last six months in introducing the Vulcanized India-rubber Car Springs upon the different railroads in this and other states, and having in particular introduced it upon the Boston and Worcester railroad with perfect success, were much gratified to find, by your paper of this morning, that the article had given satisfaction to the president of that corporation, and the terms of just commendation in which you were pleased to speak of it. But their gratification was scarcely equalled by their surprise, when, or arriving at the close of your paragraph, they found the results of all their labors attributed to a foreign source, with which the New England Car Co. has no connection. The material used on the Boston and Worcester railroad, and all the other railroads in this country, where any preparation of India-rubber has been successfully applied, is entirely an American invention, patented in the year 1844 to Charles Goodyear, of New Haven, Conn., and the application of it to this purpose and the form in which it is applied are the invention of F. M. Ray of New York. The only material now in use, and so far as has yet appeared, the only preparation of India rubber capable of answering the purpose, has been furnished under these patents by the New England Car Company, manufactured under the immediate inspection of their own agent. If any other should be produced, the right to use it would depend upon the question of its interference with Mr. Goodyear's patent. The New England Car Company have their place of business in this city at No. 99 State street, and are prepared to answer all orders for the Vulcanized India rubber Car Springs, of the same quality and of the same manufacture as those which they have already placed on your road, and most for the other roads terminating in this city."

And yet Mr. Knevelt is using these experiments made upon the Springs of the Car Company to induce the public to purchase his springs, and is attempting to impose upon them the belief that the springs used were furnished by him! We ask whether such a course is honorable, or entitles his statements to much consideration from the public.

The above Springs are for sale 98 Broadway, New York, and 99 State street, Boston.

EDWARD CRANE Agent, Boston.  
F. M. RAY, Agent, New York.

Boston, May 8, 1849.

## Devlan's Machinery Oil.

**THE** Subscribers, Agents for P. S. Devlan & Co's "Patent Lubricating Oil"—price 50c. per gallon 4 mos. or 3 per cent off for cash.

We refer to the following certificate of Messrs. Norris Brothers, in whose works, any one by calling can see the oil in use and judge for themselves.

NORRIS' LOCOMOTIVE WORKS.  
Philadelphia, April 2, 1849.

We have been using throughout our Works, during the last six weeks, "Devlan's Lubricating Oil," and so far as we have been able to judge from its use, we think it preferable to the sperm oil generally used, for both heavy and light bearings.

NORRIS BROTHERS.

For sale by ALLEN & NEEDLES,  
22 & 23 South Wharves,  
Philadelphia Pa.

14tf



## Coal.

**CUMBERLAND SEMI-BITUMINOUS COAL**  
superior quality for Locomotives, for sale by  
H. B. TEBBETTS,  
No. 5½ Pine St., New York.  
Im19

May 12, 1849.

## RAILROADS.

**NORWICH AND WORCESTER RAILROAD.**  
Summer Arrangement.—1849.

 Accommodation Trains  
daily (Sundays excepted.) 

Leave Norwich at 7 a.m., and 12 m.  
Leave Worcester at 10½ a.m., and 4½ p.m.,  
connecting with the trains of the Boston and Worcester, Providence and Worcester, Worcester and Nashua and Western railroads.



A train leaves Pomfret at 6 a.m. for Norwich.  
Leave Norwich at 5 p.m. for Pomfret.

New York & Boston Line. Railroad & Steamers.  
Leave New York and Boston daily, Sundays excepted, at 5 p.m.—At New York from pier No. 18, North River.—At Boston from corner Beach and Albany streets, opposite United States Hotel. The steamboat train stops only at Framingham, Worcester, Danielsonville and Norwich.

Freight Trains leave Norwich and Worcester daily, Sundays excepted.—From Worcester at 6½ a.m., from Norwich at 9½ a.m.

32 1y  
S. H. P. LEE, Jr., Sup't.  
July 5, 1849.

**EASTERN RAILROAD,** Spring and Summer Arrangement. On and after Thursday, March 15, '49.

 Trains will leave Eastern Railroad Depot, Eastern Avenue, Commercial-street, Boston, daily, (Sundays excepted.) 

For Lynn, 7, 10, a.m., 12, 2½, 3, 4½, 5½, 7, p.m.  
Salem, 7, 10, a.m., 12, 2½, 3, 4½, 5½, 7, p.m.  
Manchester, 10, a.m., 3, 5½ p.m.  
Gloucester, 10, a.m., 3, 5½ p.m.  
Newburyport, 7, a.m., 2½, 4½, 7, p.m.  
Portsmouth, 7, a.m., 2½, 4½, p.m.  
Portland, Me., 7, a.m., 2½, p.m.

And for Boston,

From Portland, 7½ a.m., 3, p.m.  
Portsmouth, 7, 9½ a.m., 5½ p.m.  
Newburyport, 6, 7½, 10½ a.m., 6, p.m.  
Gloucester, 7, a.m., 2, 5½ p.m.  
Manchester, 7½ a.m., 2½, 5½ p.m.,  
Salem, 7, 8, 9, 10½, 11-40, a.m., 2½, 6, 7, p.m.  
Lynn, 7½, 8½, 9½, 10½, 11-55, a.m., 3, 6½, 7½, p.m.

\* Or on their arrival from the East.

## MARBLEHEAD BRANCH.

Trains leave  
Marblehead for Salem, 6½, 8½, 10½, 11-25, a.m.  
2½, 4½, 5½, p.m.  
Salem for Marblehead, 7½, 9½, 10½, a.m., 12½, 3½, 5½, 6½, p.m.

## GLOUCESTER BRANCH.

Trains leave  
Salem for Manchester at 10½ a.m., 3½, 6½ p.m.  
Salem for Gloucester at 10½ a.m., 3½, 6½, p.m.

Trains leave  
Gloucester for Salem at 7, a.m., 2, 5½ p.m.  
Manchester for Salem at 7½ a.m., 2½, 5½, p.m.  
Freight trains each way daily. Office 17 Merchants' Row, Boston.  
Feb. 3. JOHN KINSMAN, Superintendent.

## BOSTON AND MAINE RAILROAD.

 Spring Arrangement, 1849.   
Outward Trains from Boston

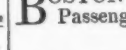

For Portland at 6½ a.m. and 2½ p.m.  
For Rochester at 6½ a.m., 2½ p.m.  
For Great Falls at 6½ a.m., 2½, 4½ p.m.  
For Haverhill at 6½ and 12 m., 2½, 4½ 6 p.m.  
For Lawrence at 6½, 9 a.m., 12 m., 2½, 4½, 6, 7½ p.m.  
For Reading 6½, 9 a.m., 12 m., 2½, 4½, 6, 7½, 9½ p.m.

Inward trains for Boston  
From Portland at 7½ a.m., 3 p.m.  
From Rochester at 9 a.m., 4½ p.m.  
From Great Falls at 6½, 9½ a.m., 4½ p.m.  
From Haverhill at 7, 8½, 11 a.m., 3, 6½ p.m.  
From Lawrence at 6, 7½, 8½, 11½ a.m., 1½, 3½, 7 p.m.  
From Reading at 6½, 7½, 9 a.m., 12 m., 2, 3½, 6, 7½ p.m.

**MEDFORD BRANCH TRAINS.**  
Leave Boston at 7, 9½ a.m., 12½, 2½, 5½, 6½, 9½ p.m.  
Leave Medford at 6½, 8, 10½ a.m., 2, 4, 5½, 6½, p.m.

\* On Thursdays, 2 hours; on Saturdays, 1 hour later.  
CHAS. MINOT, Sup't.  
Boston, March 27 1849.

## BOSTON & LOWELL RAILROAD.

 Passenger trains run as follows, viz: 

Express Trains.  
Leave Boston at 7½ a.m., 12 m. and 5 p.m.  
Leave Lowell at 8 a.m., 12 m. and 4 55 p.m.—or on the arrival of the train from Nashua.



Accommodation Trains.  
Leave Boston at 7 5 and 9½ a.m., 2½, 4½ & 6½ p.m.  
Leave Lowell at 7 and 10 a.m., 2 5 and 6 p.m.

Woburn Branch Trains.  
Leave Woburn Centre at 6, 7, 9, 10 a.m., 1½ and 4½ p.m.  
Leave Boston at 8, 11½ a.m., 3, 5½ and 7 p.m.  
On Saturdays, the last train leaves at 8 instead of 7 p.m.

The trains from Boston at 7½ a.m., and 5 p.m., and from Lowell at 4 55 p.m., do not stop at Way Stations. The trains from Lowell at 8 a.m. and from Boston and Lowell at 12 m., stop at no way station except Woburn Watering Place, and there only for Upper Railroad Passengers.

WALDO HIGGINSON,  
Agent Boston and Lowell Railroad Co.  
Boston March 5, 1849. 22tf

**ESSEX RAILROAD—SALEM TO LAWRENCE,** through Danvers, New Mills, North Danvers,



 Middleton, and North Andover.   
On and after Thursday, March 15, '49

trains leave daily (Sundays excepted,) Eastern Railroad Depot, Washington-st.

Salem for South Danvers at 8, a.m., 12.45, 3.45, 6.30, p.m.  
Salem for North Danvers at 8, a.m., 12.45, 3.45, p.m.  
Salem for Lawrence, 8, a.m., 3.45, p.m.  
" North Andover 8, a.m., 3.45, p.m.  
" Middleton 8, a.m., 3.45, p.m.  
South Danvers for Salem at 6.45, 10.15, a.m., 2-15, 5.45, p.m.  
North Danvers " 10, a.m., 2, 5.40, p.m.  
Middleton " 9.45, a.m., 5.15, p.m.  
North Andover " 9.20, a.m., 5.05, p.m.  
Lawrence " 9.15, a.m., 5, p.m.

JOHN KINSMAN, Superintendent.  
Salem, Oct. 2, 1848.

**BOSTON AND PROVIDENCE RAILROAD.**  
On and after MONDAY, APRIL 2d, the

 Trains will run as follows:— 

Steamboat Train—Leave Boston at 5 pm Leaves Providence on the arrival of the train from Stonington.

Accommodation Trains—Leave Boston at 8 a.m., and 4 pm. Leave Providence at 8½ a.m., and 4, pm.

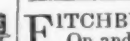

Dedham Trains—Leave Boston at 8½ a.m., 12 m., 3½, 6½, and 10½ pm. Leave Dedham at 7, 9½, a.m., 2½, 5, and 8 pm.

Stoughton Trains—Leave Boston at 1 a.m., and 5½ pm. Leave Stoughton at 11½ a.m., and 3½ pm.

Freight Trains—Leave Boston at 11 a.m., and 6 pm. Leave Providence at 4 a.m., and 7.40 a.m.

On and after Wednesday, Nov. 1, the DEDHAM TRAIN will run as follows: Leave Boston at 9 a.m., 12 m., 3, 5½, and 10½ pm. Leave Dedham at 8, 10½, a.m., 1½, 4½, and 9 pm.

WM. RAYMOND LEE, Sup't.

**FITCHBURG RAILROAD.**—  On and after Monday, April 23d, 1849, Trains will run as follows: 

Express Train.

Leaves Boston at 7½ a.m.; Fitchburg at 3 55 p.m. or upon arrival of the trains from the upper roads.

Accommodation Up Trains.

For Groton, West Townsend and Fitchburg, 6 50 and 11 a.m. and 3 40 p.m.

Concord, 6 50 and 11 a.m., 3 40 and 7 p.m.

Waltham, 6 50, 7 35, 10 and 11 a.m., 1 45, 3 25, 3 40 and 7 p.m.

Fresh Pond, Mount Auburn and Watertown, 9 a.m., 12 m. and 2 20 and 7 15 p.m.

West Cambridge and Lexington, 9 30 a.m., 2 30 and 6 30 p.m.

Down Trains.

From Fitchburg, 7 50, 11 55 a.m. and 4 40 p.m.

West Townsend, 7 30, 11 55 a.m. and 4 40 p.m.

Groton, 8 20 a.m., 12 30 and 5 15 p.m.

Concord, 6 25 and 9 a.m., 1 10 and 5 55 p.m.

Waltham, 6 50, 8 15, 9 25 and 11 a.m., 1 35, 2 35, 4 30 and 6 20 p.m.

West Cambridge and Lexington, 7 and 11 15 a.m. and 4 45 p.m.

Fresh Pond, Mount Auburn and Watertown, 7 15 and 10 a.m., 1 30 and 4 30 p.m.

The 6 50 a.m. up train will not stop at Stony Brook, Lincoln and Lunenburg.

The 11 a.m. up train will not stop at Weston and West Acton.

The 3 40 p.m. up train will not stop at Charlestown Porters, West Cambridge and Lunenburg.

The morning train down will not stop at Lunenburg and Lincoln.

The evening train down will not stop at Lunenburg and Stony Brook.

S. M. FELTON, Superintendent.

Boston, April 21, 1849. 22tf

## CORROSIVE SUBLIMATE.

**THIS** article now extensively used for the preservation of timber, is manufactured and for sale by POWERS & WIGHTMAN, manufacturing Chemists, Philadelphia.  
Jan. 20, 1849.

# AMERICAN RAILROAD JOURNAL.

## NEW YORK AND ERIE RAILROAD. EXTENDED TO OWEGO.

On and after the 1st June, the trains will run as follows, daily, excepting Sundays: For Passengers—Through trains will leave New York for Owego by steamboat, from the Duane-st. pier, at 7½ o'clock, A.M. and 5 o'clock, P.M. stopping at Ramapo Station, Chester, Goshen, Middletown, Otisville, Port Jervis and all the way stations west of the last-named place; and will leave Owego on and after the 4th June, at 6 A.M. and 7 P.M.; and Binghamton, on and after the 1st June, at 7 A.M. and 8 P.M. arriving in New York at 7½ P.M. and 8½ A.M. stopping at all the way stations between Owego and Port Jervis; and, east of Port Jervis, at Otisville, Middletown, Goshen, Chester, Ramapo Station and Spring Valley. Way Trains for Port Jervis and all the intermediate stations, will leave New York, by steamboat Thomas Powell, from Duane-st. pier, at 7½ A.M. and 4 P.M.; and will leave Port Jervis at 6 A.M. and 4 P.M. Milk Trains—A train leaves Otisville at 5½ A.M. arriving in New York about 11. The afternoon milk is taken by the train leaving Port Jervis at 4 o'clock P.M. and arriving in New York about midnight. Freight—Freight leaves New York every night for all the regular stations on the road. A freight train will leave Owego every morning at 6 o'clock; and another will leave Port Jervis, as usual, every morning at 8 o'clock, with market freight, &c. JAS P. KIRKWOOD, May 30, 1849. Superintendent.

## NEW YORK & HARLEM RAILROAD, DAILY. WINTER ARRANGEMENT.

On and after December 1st, 1848, the Cars will run as follows, until further notice:—

Trains will leave the City Hall, New York, for Harlem and Morrisiana at 7, 9, 9.30, 11, am. 12 m., 2, 4, 4.15, 5.30, pm.  
Trains will leave the City Hall, New York, for Fordham and Williams' Bridge, at 7.30 and 9.30 am., 12 m., 2, 4.15, 5.30 pm.  
Trains will leave the City Hall, New York, for Hunt's Bridge, Underhill's and Hart's Corners, at 9.30 am., 4.15 pm.  
Trains will leave the City Hall, New York, for Tuckahoe and White Plains, at 7.30 and 9.30 am., 3 and 4.15 pm.  
Trains will leave Davis' Brook, Pleasantville, Chappaqua, Mount Kisko, Bedford, Mechanicsville, Purdy's and Croton Falls, at 7.30 and 9.30 am., 3 pm.

NOTICE—Passengers are reminded of the great danger of standing upon the platform of the cars, and hereby notified that the practice is contrary to the rules of the Company, and that they do not admit any responsibility for injury sustained by any passenger upon the platforms, in case of accident.

Returning to New York will leave  
Morrisiana and Harlem at 7.20, 8.50, 10 am., 12 m., 1.35, 3, 3.45, 5, 5.35 pm.  
Fordham and Williams' Bridge at 7, 8.30, 9.50 am., 1.15, 3.25, 5.20 pm.  
Hunt's Bridge at 8.20, am., 3.18 pm.  
Underhill's Road at 8.10 am., 3.08 pm.  
Tuckahoe at 8.05, 9.30 am., 3.05, 5 pm.  
Hart's Corners at 7.55 am., 2.52 pm.  
White Plains at 7.45, 9.10 am., 2.45, 4.40 pm.  
Davis' Brook at 9 am., 2.35, 4.30 pm.  
Pleasantville at 8.49 am., 2.20, 4.19 pm.  
Mount Kisko at 8.30 am., 2, 4 pm.  
Bedford at 8.25 am., 1.55, 3.55 pm.  
Mechanicsville at 8.15 am., 1.45, 3.45 pm.  
Purdy's at 8.05 am., 1.35, 3.35 pm.  
Croton Falls, at 8 am., 1.30, 3.30 pm.  
The trains for Harlem and Morrisiana leaving City Hall at 7, 9, 9.30, 11, 12, 2, 4, and 5.30, and from Morrisiana and Harlem at 7.20, 8.10, 12, 1.35, 3, 3.45, and 5 o'clock, will land and receive passengers at 27th st., 42d, 51st, 61st, 79th, 86th, 109th, 115th, 125th, and 132d streets.

The 7.30 am., and 3 pm. Trains from New York to Croton Falls, and the 8 am. Train from Croton Falls will not stop between White Plains and New York, except at Tuckahoe, Williams' Bridge and Fordham.

A car will precede each train ten minutes to take up passengers in the city. The last car will not stop, except at Broome st. and 32d street.

Freight Trains leave New York at 6 am. and 1 pm.; leave Croton Falls at 7 am. and 2.30 pm., Sundays excepted.

NOTICE—On Sundays the 7 am. to Harlem and Morrisiana, returning at 8 o'clock, and the 7.30 am. to Croton Falls, returning 1.30 pm., will be omitted, and the 7 am. from Williams Bridge will leave at 7.40

## ST. LAWRENCE & ATLANTIC RAILROAD COMPANY.

Notice is hereby given that the Trains run twice per day between

Montreal and St. Hyacinthe, leaving each terminus alternately, until further notice.

Leaving St. Hyacinthe at - - 7 am.  
" " " " " " 3 pm.  
Leaving Montreal at - - 10 am.  
" " " " " " 6 pm.

THOMAS STEERS, Secretary.

May 31, 1849.

## BALTIMORE AND SUSQUEHANNA RAILROAD.—Reduction of Fare. Morning and Afternoon Trains between Baltimore and York.—The Passenger Trains

run daily, except Sundays, as follows:

Leave Baltimore at - - 9 am. and 3½ pm.  
Arrive at - - 9 am. and 6½ pm.  
Leave York at - - 5 am. and 3 pm.  
Arrive at - - 12½ pm. & 8 pm.  
Leave York for Columbia at - 1½ pm. & 8 am.  
Leave Columbia for York at - 8 am. & 2 pm.

Fare:  
Fare to York - - - \$1 50  
" Wrightsville - - - 2 00  
" Columbia - - - 2 12½  
Way points in proportion.

## PITTSBURG, GETTYSBURG, AND HARRISBURG.

Through tickets to Pittsburg via stage to Harrisburg - \$9  
Or via Lancaster by railroad - 10  
Through tickets to Harrisburg or Gettysburg - 3  
In connection with the afternoon train at 3½ o'clock, a horse car is run to Green Spring and Owing's Mill, arriving at the Mills at - 5½ pm.  
Returning, leaves Owing's Mills at - 7 am.  
D. C. H. BORDLEY, Sup't.  
Ticket Office, 63 North st.

## GEORGIA RAILROAD. FROM AUGUSTA TO ATLANTA—171 MILES.

AND WESTERN AND ATLANTIC RAILROAD, FROM ATLANTA TO DALTON, 100 MILES.

This Road, in connection with the South Carolina Railroad, and Western and Atlantic Railroad, now forms a continuous line, 408 miles in length, from Charleston to Dalton (Cross Plains) in Murray county, Ga. 32 miles from Chattanooga, Tenn.

### RATES OF FREIGHT.

|           |  | Between Augusta and Dalton. | Between Charleston, and Dalton. |
|-----------|--|-----------------------------|---------------------------------|
|           |  | 271 miles.                  | 408 miles.                      |
| 1st class | Boxes of Hats, Bonnets, and Furniture, per cubic foot -  | \$0 18                      | \$0 28                          |
| 2d class  | Boxes and Bales of Dry Goods, Saddlery, Glass, Paints, Drugs, and Confectionary, per 100 lbs. -  | 1 00                        | 1 50                            |
| 3d class  | Sugar, Coffee, Liquor, Bagging, Rope, Cotton, Yarns, Tobacco, Leather, Hides, Copper, Tin, Feathers, Sheet Iron, Hollow ware, Castings, Crockery, etc. - | 0 60                        | 0 85                            |
| 4th class | Flour, Rice, Bacon, Pork, Beef, Fish, Lard, Tallow, Beeswax, Bar Iron, Ginseng, Mill Gearing, Pig Iron, and Grindstones, etc. -                          | 0 40                        | 0 65                            |
|           | Cotton, per 100 lbs. -   | 0 45                        | 0 70                            |
|           | Molasses per hogshead -  | 8 50                        | 13 50                           |
|           | " " barrel -   | 2 50                        | 4 25                            |
|           | Salt per bushel -  | 0 18                        |                                 |
|           | Salt per Liverpool sack -  | 0 65                        |                                 |
|           | Ploughs, Corn Shellers, Cultivators, Straw Cutters, Wheelbarrows -   | 0 75                        | 1 50                            |

German or other emigrants, in lots of 20 or more, will be carried over the above roads at 2 cents per mile.

Goods consigned to S. C. Railroad Company will be forwarded free of commissions. Freight payable at Dalton.

F. C. ARMS, Sup't of Transportation.

## LITTLE MIAMI RAILROAD.—SUMMER ARRANGEMENT.

CINCINNATI & SANDUSKY.

FIRST Passenger Train leaves Depot on East Front street, at 5 o'clock 10 minutes A. M. stops for breakfast at Morrow, and arrives at Springfield at 11 10 A. M. Leaves Springfield for Sandusky at 11 50 A. M.

Second Passenger Train leaves Depot 3 P. M. arrives at Springfield at 9 P. M. Passengers take tea at Springfield, and leaves for Sandusky at 9½ P. M.

RETURNING—First Train leaves Springfield at 4 A. M. Stop for breakfast at Xenia, and arrives at Cincinnati at 10 15 A. M.

Second Train leaves Springfield at 2½ P. M. Stop for tea at Morrow, and arrives at Cincinnati, at 8½ P. M.

Passengers taking the Morning Train arrive at Sandusky at 9 P. M. Those taking the Afternoon Train arrive at 7½ A. M. next morning, and proceed directly on in the boats.

Passengers for Columbus, Zanesville, Wheeling, and intermediate towns, should take the 5, 10 A. M. Train.

The Ohi Stage Company are running the following Lines in connection with the Trains:

A Daily Daylight Line to Columbus from Springfield in connection with the Morning Train from Cincinnati. Also, Daily Lines to Columbus, from Xenia and Springfield, connecting with the 3 o'clock, pm. Train from Cincinnati.

Fare from Cincinnati to Xenia - \$1 90  
Do do Springfield - 2 50  
Do do Sandusky City - 6 50  
Do do Buffalo - 10 00  
Do do Columbus - 4 50

For other information and through tickets, apply at the Ticket Office on Broadway, near Front-st., Cincinnati.

W. H. CLEMENT, Superintendent.

The Company will not be responsible for Baggage exceeding 50 dollars in value, unless the same is returned to the Conductors or Agent, and freight paid at the rate of a passage for every 500 dollars in value above that amount.

## BALTIMORE AND OHIO RAILROAD, MAIN STEM.

The Train carrying the Great Western Mail leaves Baltimore every morning at 7½, and Cumberland at 8 o'clock.

passing Ellicott's Mills, Frederick, Harper's Ferry, Martinsburgh and Hancock, connecting daily each way with—the Washington Trains at the Relay House seven miles from Baltimore, with the Winchester Trains at Harper's Ferry—with the various railroad and steamboat lines between Baltimore and Philadelphia, and with the lines of Post Coaches between Cumberland and Wheeling and the fine Steamboats on the Monongahela Slack Water between Brownsville and Pittsburgh. Time of arrival at both Cumberland and Baltimore 5½ P. M. Fare between these points \$7, and 4 cents per mile for less distances.—Fare through to Wheeling \$11, and time about 36 hours, to Pittsburgh \$10, and time about 32 hours.—Through tickets from Philadelphia to Wheeling \$13, to Pittsburgh \$12. Extra train daily, except Sundays, from Baltimore to Frederick at 4 P. M., and from Frederick to Baltimore at 8 A. M.

### WASHINGTON BRANCH.

Daily trains at 9 A. M., and 5 P. M., and 12 at night from Baltimore, and at 6 A. M. and 5½ P. M. from Washington, connecting daily with the lines North, South and West, at Baltimore, Washington, and the Relay House. Fare \$1 60 through between Baltimore and Washington, in either direction, 4 cents per mile for intermediate distances. s13 y1

## PHILADELPHIA, WILMINGTON, & BALTIMORE RAILROAD.

Summer Arrangement. April 1st, 1849.—Fare \$3.

Leave Philadelphia 8½ am., and 10 pm.  
Leave Baltimore 9 am. and 8 pm.  
Sunday—Leave Philadelphia at 10 pm.  
" " Baltimore at 8 pm.  
Trains stop at way stations.

Charleston, S. C.

Through tickets Philadelphia to Charleston, \$20.

Pittsburg and Wheeling.

Through ticket, Philadelphia to Pittsburg, \$12.

" " Wheeling, 13.

Through tickets sold at Philadelphia office only.

Wilmington Accommodation.

Leave Philadelphia at 12 m. 4 and 7 pm.

Leave Wilmington at 7½ am., 4½ and 7 pm.

Newcastle Line.

Leave Philadelphia at 2½ pm.—Baltimore at 1½ pm.

Fare \$3.—Second class, \$2.

N.B.—Extra baggage charged for.

I. R. TRIMBLE, Gen. Supt.